

AVIATION WEEK

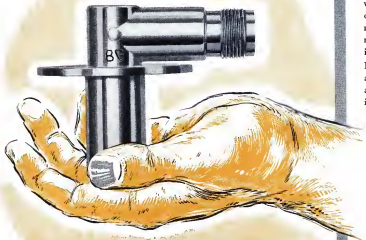
MAY 12, 1952

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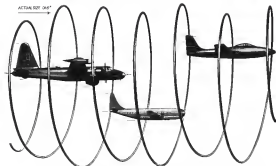
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DOMESTIC

Mining PAA Struckdown, which disappeared Apr. 29 on flight from San Diego to Boston and Boston Area to New York, was found May 1 wrecked in dense jungle area in central Borneo. Aerial examination of wreckage indicates all 41 passengers and crew were killed.

CAA-initiated evaluation of "caterpillar" system of runway approach lighting was completed last week, although CAA and Air Line Pilots Assn. favor the system, it is expected that FAA will fight strongly to retain it as standard, although some pilots insist 94% of the instrument approaches in this country (See *Captain Viewpoint*, p. 96).

Flow control for production of bonded and rotor blades has been signed by Powert Aircraft Co., Clinton Heights, Pa., and Powert Helicopter Corp., Memphis, Pa. Blade order for Powert HRP-2. Details of the new blades were turned in *Aircraft Week*, May 5, p. 12.

James M. Hatten, 64, transport pilot and former vice president of American Overseas Airlines, died May 1 in N. Y. C. He first became associated with commercial aviation in 1953, the following year he had established an air service between Tampa and St. Petersburg, Fla.

Many carrier planes can now overcome bumps "up to the largest size produced any place in the world." Vice Adm. John F. Chaney told a meeting at the Aviation Writers Assn. in Washington, D. C.

Passenger-carbonator discharges definitely caused the crash of the U. S. Airlines C-46 into Jamaica, N. Y., since CAA and CAAH investigations were reported in *Aircraft Week*, Apr. 28, p. 31.

Gen. Hoyt S. Vandenberg went to Doctor's Hospital, Washington, D. C., last week for an abdominal operation after being struck at his Pentagon office. Cause of the USAF's Chief of Staff's ailment was unknown at press time.

Some panicky passengers refused to leave the PAA DC-4 which crashed in the water off San Juan, Puerto Rico, last month, pilot told CAA investigators last during the crash hearing. The crew especially got only one of three life rafts out of the crashed plane.

NEWS DIGEST

New phonetic radio alphabet set for official adoption by ICAO catches this summer in under criticism by the International Federation of Airline Pilots Assn., which says it has decided not to use it. U. S. and other pilots, however, they would not use the alphabet.

FINANCIAL

G. M. Guaranti & Co., Pasadena, Calif., aircraft and motor instrument maker, reports sales of over \$1 million in 1953, \$2,577,379 for the entire year of 1951.

Jack & Hinkle, Inc., Cleveland, reports net sales of \$7,536,380 for the three quarters ended Mar. 31, with net income after federal income taxes of \$123,961. Unfilled orders backlog is nearly 379 million.

Boring Airplane Co., Seattle, had net earnings of \$1,944,240 for the first quarter of 1953 after provision for federal and state income and excess profits taxes. Sales and other income for the period were \$165,552,498.

Pan American World Airways, Inc., had net earnings of \$6,516,000 during 1951 after provision for federal income taxes. Gross revenues were \$185,560,000.

Aerograph Corp., Jackson, Mich., re-

ports net profits of \$475,557 on sales of \$10,099,226 during the six months ended Mar. 31, six months' sales represent a 72% gain over the same period the previous fiscal year. Total sales this year are expected to be near \$10 million.

Monmouth-Honeywell Regulator Co., Monmouth, had net sales of \$19,150,517 in 1952, and \$18,158,517 is reported in the Apr. 28 issue.

Ryan Aeronautical Co., San Diego, has declared a regular quarterly dividend of 10 cents per common share payable June 12 to holders of record Mar. 22.

Gussett Corp., Los Angeles, had consolidated net sales of \$16,385,594 for the nine months ended Mar. 31, with total net earnings after federal income taxes being \$2,695,445.

INTERNATIONAL

National Aviation College in Indianapolis will merge organization and operations assistance from the International Civil Aviation Organization's far East and Pacific office in Melbourne, Australia. School would train technicians within flight and ground crew. ICAO will also provide experts in personnel licensing, safety, communications and administration for the college.

Transfer of international air traffic transactions in the International Air Transport Assn. clearance house in London totaled \$14,932,000 during February, compared with \$18,261,000 for the same month of 1951. Its reflecting credit and debit balances, \$7,615,000 of 3-clearance transactions were settled without payment of making air club payments.

Lester Serpentinek, Venetian, has been awarded the Inter-American Society Council award Aviation Safety Plaque for the third consecutive year. ICAO in 1951 saw 72,518,350 passenger miles without injury to passengers or crew.

Canadian transport bomber crashed during a flight from Pittsburgh, KSE last center. It was the path Canadian to crash since last June.

Norwegian transport crashed and burned 150 miles southeast of Oslo with nine passengers and two crew. It crashed killed and 10 others injured. The chartered plane carried 29



REPAIRS: PAA with plane listed to some made the 140,000 lbs. of military equipment delivered under Mutual Defense Assistance Program. The plane was taken Apr. 10 aboard the carrier USS Toledo which found a number of Thunderbolt engines for delivery to The Netherlands and Belgium.

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May 12-14—National conference on airborne electronics, co-sponsored by Institute of Radio Engineers' Dayton section and Professional Group on Airborne Electronics, Dayton Whitman Hotel, Dayton, OH.

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Map 14—National awards received from within Awards Industries Ass., naming Hotel Statler, Washington, D. C.

May 14-16—Society for Experimental Stress Analysis national meeting, Hotel Lincoln, Indianapolis

May 19 1944, American Helicopter Society
annual forum and banquet, Hotel Wash-
ington, Washington, D. C., May 17-18.

May 13-16—Aericut Industries Ann. Board of Common meeting, Williamsburg, Va.

May 16—National Armed Forces Day dinner, Hotel Statler, Washington, D. C.
May 17-18—National Pilot Air Meet and

May 19—International Air Transport Assn, technical committee and medical research

May 26—Institute of the Astronomical Sciences morning, Cleveland Akron section.

May 21-International Air Transport Assn
General committee meeting, Rome, Italy

May 22—American Pocket Society dinner,
Hotel Astor, New York.

May 22-23—Aeronautical Training Society

May 11—Philadelphia American Country

June 13—Airport lighting conference and

James J. Sweeney, of Automotive Engineers

June 5.—Council for military aircraft stand-

June 4-5—California Association of Accountants, Anaheim; Industrial Arts, meeting, Hotel Statler, New York.

Excavators & California Avianists Trade
Area conference, Stockton, Calif
June 9-11, National Day Protection Area

June 25-29—American Society of Microbiology

June 17-18—Aircraft Trade Shows resume

July 12—Aviation Writers Ass. annual

PICTURE CREDITS

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51 EATON WING TANKS—Boeing's new B-67 Strikemaster (right) is fitted with large external blast-buff airfoils (left) that tuck under its wings, increasing the 93-ton medium bomber's range considerably. The B-67 also has more powerful 5,000-hp Pratt & Whitney TF39 turbofans. Former engines were rated at 3,200 hp. For production details of the new wing tanks see Aviation Week Mar. 5, p. 29.



SCORPION AND THE MOON—brings plus
vies. (left) is a life model Northrop F-49 Scorpion,
all-weather fighter with a bright nose visible at two
o'clock from the observer's nose. The unnamed
Scorpion is in ascent with the Western Air De-
fense Force.

HELIX DEVELOPMENTS—Photos below show a Hiller 360 helicopter (left) fitted with Insulite disinsectwood and a new HITE-2 Navy trainer in flight. Note fanning above the cabin around the main control stick at the 180°. HITE 2 is on its way down for Naval Reserve units being selected at maximum rates in the U.S.



Taft's Air Power Backers

Three top staffed air officers are backing Sen. Robert Taft's campaign for all-out emphasis on air power in the defense buildup. Taft's critics at the Administration's disposal in a golden speech: "The same old balanced approach for ground combat is dominating."

Concerning War Plans

• **Adm. Louis Donnell**, former Chief of Naval Operations: "It is important that we be prepared to get an ever ring around the Russian lion's paw in the event of an emergency, that ring to consist of Air Force land-based planes and Navy aircraft carrier-based planes. The Navy and Air Force are our first line of defense, as we cannot expect to compete with large land armies on the continent of Europe and Asia."

• **Lt. Gen. Harold Gamm**, former commanding general AAF, Military Air Transport Command, now vice president of Hughes Aircraft Co.: "Your exposition of the concept of air power in the defense of this nation need not be our military policy if this country is to survive in its battle against communism."

• **Lt. Gen. Hugh Ryan**, former Air Force inspector general: "The way to get the military policy (of all-out emphasis on air power) that you so accurately appraise is essential to maintenance of American liberties is to abolish the Joint Chiefs of Staff as a tripartite and isolate the single general staff . . . strongly advocated within the military forces up to the time the Joint Chiefs of Staff was adopted. Such a single general staff, with officers for the Army, Navy, Air Force and industry reporting through a single Chief of Staff to the General Staff as Chief and the Congress, will mean an end to military waste and professional jealousy."

Naval Air Backs Stretchout

Top Naval Aeronautics are solidly backing the Administration's stretchout of aircraft production—although they will oppose the further stretchout that would be necessary to meet the \$1.50 billion out of the House bill in the \$1.5 billion before the Administration recommended for Naval aircraft procurement over the coming fiscal year, which starts July 1.

They expect the Administration's stretchout to make for a more efficient program, permitting design changes for improved performance throughout. Navy has no plans to freeze models.

Comment on the Administration's stretchout:

• **Deputy Chief of Naval Operations** for Air, **Vice Adm. John Cassin**: "We have backed the house, there is an undeniable pricing of requirements for new and more ships."

• **Rear Adm. Thomas Connelley, Chief, BuAer**: "The decision to replace our production schedule over a longer time span should give particularly beneficial to the aircraft industry, because under the revised schedule production no longer will have to be pushed up to a high peak for a short time and then tapered sharply to the long-term sustaining level. Further, this spreading has given us more time for the proper introduction of new aircraft design changes which are essential if we are not to produce a large volume of aircraft which are becoming obsolescent in terms of their reliability against enemy aircraft."

Air Force leaders are less enthusiastic about the Ad-

ministration stretchout. But in congressional testimony, Secretary for Air Thomas F. Ryan suggested it, and USAF's Chief of Staff, Gen. Hoyt Vandenberg, with a moderate show of misgivings, also is going along.

Both Feltner and Vandenberg, however, are opposing the further stretchout of aircraft production that would be necessary if the House out of \$160 million in the \$1.5 billion recommended by the Administration for coming 1955 fiscal year aircraft procurement needs.

Opposition to Air Navy

Some air standards are antagonistic to the proposal that the Chief of Naval Operations and all fleet commanders be airman.

• **Senator Adm. Frederick Sherman**, commander of the Lexington in the Battle of the Coral Sea and one of the highest leaders of World War II, is urging Congress to open legislation regarding this.

But other Navy Airmen now the plan as the stepstone to a merger with the Air Force, in which the Navy would be subordinated to it. They point out that only all Navy air commands are held by airmen. They will however know in a second air force, with the stage for establishment of a single, dominant air arm, supported by auxiliary ground and sea forces.

Out of Navy's 257 commands on active duty, only 54 are airmen. And only one of the Navy's four fleets is primarily commanded by an aviator: the Pacific Fleet under Vice Adm. Arthur Radford.

Too Many AF Generals?

Strong patterns in developing in Congress to hold down the officer strength of the services, particularly the number of admirals and generals.

House Armed Services Committee will start hearings on legislation soon.

Meanwhile, a stipulation backed into the 1955 military budget by the House limits number of admirals with the rank of captain or lieutenant or higher according to a percentage of total military strength.

There is speculation as to what the stipulation might mean—whether it would put slow down promotions or actually result in demotions. House Armed Services Committee wants to replace it with well-coordinated legislation.

Data on officer strength of the services under programs for the coming year shows USAF to have the greater proportion of both generals and other officers.

• **Air Force**: 457 generals, or one out of every 2,321 military personnel.

• **Navy**: 287 admirals, or one out of every 2,669 military personnel.

• **Army**: 518 generals, or one out of every 1,960 military personnel.

• **Marine Corps**: 80 generals, or one out of every 4,861 military personnel.

• **Other strength in general**:

• **Air Force**: 147,616 officers, or one out of every 7.6 military personnel.

• **Navy**: 50,769 officers, or one out of every 10 military personnel.

• **Army**: 127,340 officers, or one out of every 12 military personnel.

• **Marine Corps**: 19,524 officers, or one out of every 12 military personnel.

—Katharine Johnson

Further Air Power Stretchout Is Opposed

• All-out effort is made to restore House cuts.

• Vandenberg and Bradley warn of Soviet buildup.

By ANTHONY WEXA
Washington Staff

One game winning followed another last week to the U.S. Senate in top military leaders made an all-out effort for restoration of the House-imposed cuts on U.S. air power and other military programs.

Air Force Chief of Staff Hoyt S. Vandenberg warned that Russia's air force is now larger than ours and is fast approaching ours in quality under the huge manufacturing program now underway there.

• **Crippling Effects**—"Unless the crippling effects of the House action are undone, this country's margin will shrink to nothing in the next two years and control of the air will all that it implies will then be within the grasp of the Soviet Union," Vandenberg testified to the Senate.

Gen. George Bradley, Chairman of the Joint Chiefs of Staff, stated that Soviet advances in aircraft engines and industrial capabilities had now reached a point where "Russia might seek a major agreement."

Mid-June was indicated as the danger point deadline, and stretchout of the U.S. air power buildup called for by the House cuts would take any readiness for beyond that time, possibly to 1957, the military leaders said.

• **Plants to Close**—"If we supply our own production facilities (where none were not closed) will be closed if House cuts in the 1955 Air Force budget are not withdrawn, Air Force Secretary Thomas E. Feltner warned in strongly worded testimony before the Senate Appropriations Committee.

Six of the plants to be closed are already in operation and two others are scheduled to open soon as part of the USAF's broadened aircraft production base plan, which will be seriously damaged, overall, if the House cuts go through unchanged.

Specifically, Feltner asked for an increase of \$2,694,430,876 saved from the Air Force budget. This is

Policy Commission Is Set Up

Establishment of a new Production Policy Advisory Commission to advise the Defense Department and the Office of Defense Mobilization on long-range production policy and scheduling problems. Last week proposed a major change in the Washington defense mobilization staff.

First two of the seven-member Production Policy Advisory Commission will be named: Sen. Harold Vanecko, board chairman and president of Studebaker Corp., and Elmer Clay Ballard, president of Chase Aircraft Co., who has just relinquished his post as Special

Assistant for Production to Defense Secretary Robert Lovett. Charles Stuebel, chief director at GDM, is named executive secretary. Meanwhile DPA Administrator Mandy Fenderson named his deputy, William L. Campbell, to take over as acting chairman of the Aircraft Production Board, succeeding Harold (Red) Ryan who resigned. It is generally understood that the Campbell appointment is an interim arrangement, since he is expected to leave government next or June 30.

Under \$160 million for strength and related procurement, \$150 million for major procurement other than aircraft, \$617,861,855 (of an original estimate of \$625,026,155) for maintenance and operations, \$167,719,080 for military personnel, \$10 million for National Guard, and another \$10 million for "contingencies." Air Force did not ask for reduction of \$2.2 million slashed by the House for aircraft activities.

• **What It Means**—"The Air Force Secretary also said that Section 630 of House Bill 7791, the Military Appropriations Bill for 1955, he believed, was serious enough to lead actual expenditures by the Defense Department to \$46 billion for the fiscal year 1955. If this saving is approved, he said, USAF would be allocated only \$17.4 billion of the total.

If the House-imposed \$17.4 billion ceiling for Air Force expenditures in 1955 is approved, this is what it will mean:

• **Loss of approximately 1,000 aircraft during the period Jan. 1, 1955 to June 30, 1956.**

• **Closing of eight major production facilities, of which six are already in operation and two are about to open.**

This seriously affects USAF's mobilization base.

• **Dislike cuts in maintenance below authorized and in level of all times.**

Specifically, Feltner asked for an increase of \$2,694,430,876 saved from the Air Force budget. This is

level of ground support and maintenance equipment for aircraft and the ground electronic equipment for the control of aircraft for U.S. defense before fiscal 1955.

• **Reduction in planned personnel force of 1,061,080 to 964,230, representing a 10% cut of the proposed overall strength of USAF.** The proposed cut will undermine the 143 wing structure because USAF has programmed a 50% increase in striking power, building from 95 wings to 143, accompanied by a 137% increase in personnel. Not only will be deletion of 21 air bases, but also 12 others have been lost due to reduction in funds available for procurement of spares and spare parts, aviation gasoline and oil.

• **Stretching**, the Stuebel-Feltner decision that if the proposed changes are approved the timetable for the proposed 143-wing Air Force will be extended from Feb. 1, 1955 to the last half of the calendar year 1957. This will be, he said, "a major blow to our power. It would increase the chances of war and it would make this country vulnerable in the event war should come."

In documentation of the Air Force position, submitted last the Senate that the Joint Chiefs of Staff supported 143-wing Air Force divided among the three front-line forces of the Air Force operations.

"The Air Defense Command," he said, "has absorbed a entire number of atmospheric fighter wings. These in turn, along with the sub-aircraft

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VISCOUNT 700 is sister of British European Airways jet production prototype of earlier series. Vertical scope is for noise consideration studies.

boon the aircraft's fuel system. Various is poured (negative) as compressed in a variable drive linkage in the throttle control. Correct setting can be made before take off, afterwards correct checked into it maintained by the control unit.

Water-mechanical injection is used to maintain take-off power above the ICAN temperature conditions.

►Retrol. Props—Our blade, 10 ft diameter Retrol props have been specified for early production aircraft. These props are hydro-mechanical, operated on engine oil supply and located for feathering by a special pump and supply.

Blade angle range is from 4 deg. for ground start through 75 deg. for flight. With pitch at about 50 deg. fully feathered.

Microswitches in the leading gear control the ground start position, so that the gear is compressed, but power can be obtained normally. There is a pilot-controlled override switch in the cockpit, which is moved to the "up" position just before take off, this permits the prop from moving into full low pitch at the cost of engine power lost while the gear is still partially compressed. When the aircraft is off the ground, the switch is moved to the "up" position.

Automatic feathering operates under two conditions. Throttles positioned at cruise or above, and during a no load landing. In the former case, a switch in the throttle control causes the feathering action. In the latter, engaging takes place when the pilot moves throttles forward for power after achieving the landing.

►Engine Controls—Each engine is controlled by two levers, one being the throttle and the other a combined high-pressure fuel cock and prop feathering control.

The throttle controls the flow rate in the fuel cut and is also linked to the prop control governor in the cam-actuated unit. The linkage passes from correct ratio between prop and fuel flow.

Engine starting panel is mounted by the second pilot, it consists of a

starter button and an engine selector switch. Adjacent to this are fuel shut-down control switches which operate actuators connected directly to the fuel control unit linkage. Fuel indicators in the master instrument panel show relative positions of various control valves.

As part of the development program for engine installation, BEA decided to convert two Douglas DC-5 airplanes to turbo-prop power. These aircraft—called Dart Dakota by the British—have been run as freight carriers for BEA a total time of over 700 engine flight hours.

As far as possible, the Viscount installation was duplicated on the Dart Dakota. Cooling assemblies were not possible, nor did the Dart Dakota have pressurized exhaust. The former was not, the latter was installed by feathering of the valves.

►Initial Flights—After the prototype Viscount had flown for 251 hr, it was given a limited certificate for operation without fuel-cupping permission. The only aerodynamic change suggested by these trials was a change in stabilizer incidence. After that was done, handling characteristics were thoroughly tested.

The overall ground pitch setting of 4 deg. was found to be too high because the prop developed too much thrust when idling. Its dropping five angle to 0 deg. the problem was solved.

There was criticism of the use of power screws during revised landing approach procedure. Approach speed was governed at 150 mph (240 kph) and the prop blades were in an unpropagating cruise pitch. When throttles were opened, the interaction between throttle and prop controls called for lower pitch in the blades to accommodate the increase in rpm. This pitch reduction caused a momentary loss in thrust which resulted in aircraft deceleration. This changed quickly to acceleration as the pitch increased again to absorb the increased engine power.

►Selection—To solve this, the engine was set so that response rate should be equal to or better than that obtainable from a piston engine.

First step was to increase the ap-

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patch-offing rate to 10,000, this made the approach blade setting much easier and power consumed did not cause the thrust loss. As a secondary benefit, as soon as the surface has touched down, the light lift patch stay is withdrawn to prevent the compensation drag.

There was a further improvement in fitting microswitches into the landing flap control. These switches are operated by the flaps. Flaps are automatically lowered from an intermediate position to full deflection when throttles are closed, and are quickly raised if the flaps are later opened for evasive or reduced landing.

Engine Experiment—Both BEA and Vickers have learned much from the three hours gathered by the Dakota and Viscount.

Special Dual-electric starting equip-

ment was developed by BEA for the Dakota, but other than that, there has been no problem many from ground runs of the engine. The engine ground operation is less complicated than that for piston engines, because of its controls to operate and simplified check procedure.

On the Viscount's European tour in early 1950, the average time from engine start to taxi start was 24 min. Initial cockpit checks, starting procedure, pre-take-off and post-land checks took less than 4 min.

Timing technique, says BEA, has proven to be little different from normal piston engine practice. Engine rpm is considerably higher, being about 25% of maximum continuous. The throttle is used less, as the interests of noise, fuel-pipe temperature, constant

and thus increasing engine life. Limited the better are used more on the Dakota, these should be no penalty with somewhat steering on the Viscount.

Noise level in taxi is higher than previously reported, and this is the consequence of a particularly noticeable. • Drawback—Main—Disadvantage on ground runs is the high fuel consumption. For the Dart, the fuel burned is about the necessary operating data for a piston engine of the same horsepower. From engine viewpoint, ground running takes about 75% of the non-idle engine fuel consumption.

One airborne problem of other Viscount or Dart Dakota is basically those of any very transport. BEA does sound on, rate of descent is talking about the necessary operating data for the flying case. Charts have been used for the Dart Dakota, but BEA suggests that tables or even computer may be necessary.

During Viscount flight trials, best climb speed was found to be 155 knots (approximately indicated) speed with a corresponding stall rate of climb of 1,700 fpm. This probable reduces to 100 fpm at the cruise altitude of 20,000 ft.

Cruise flight is conducted at constant rpm and indicated speed, and the plane is allowed to climb as weight decreases. This was complicated to be the suitable compromise between economy and control simplicity. Landing is on two engines at about 210 knots.

Engine Maintenance—After three flights, BEA reported "the remarkable serviceability given by the engines" and the "ease of airframe maintenance."

The only work necessary on the engine during these flight trials—not including routine maintenance—the replacement of a single main igniter.

Typical maintenance times for engine work are tried by Vickers in absolute minima. Complete powerplant change in 35 min; a starter motor can be replaced in 15 min; and a fuel-injection pump in 30 min. Extension of the latter takes 10 min.

During BEA's trials of the Viscount, scheduled maintenance was carried out to 8.44 per flight hour. Unscheduled maintenance raised this figure to 0.45.

Scheduled maintenance during BEA's tour included 48 preflight, 22 daily and two 50-hour checks. Preflight inspections occupied 15 min, daily inspections took about 14 hr. The 50-hr checks required 54 hr, and Vickers feels that this could be reduced with increased experience on the aircraft.

Flight Data—One of the significant features of the BEA flight was that differences between pilots-in-matter of oil and consumption—produced (Continued on page 15)



GENERAL ELECTRIC'S WINGED MESSENGER

Henry Al, one of a mass of smaller units developed by U. S. Army Ordnance by the General Electric Co., is shown being hoisted at White Sands Proving Ground, N. M. Extensive tests of the Al missiles that of German World War II anti-aircraft missile Wacacraft, a reposition, rocket

propelled weapons. Apparent changes from German layout include clipped wings and rounded nozzles. Stunning Wacacraft dimensions were kept. All diameter is about 1 ft., overall length about 25 ft. Purpose of test flights is to determine base data for tactical missile design.

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in Air Power

Pratt & Whitney Aircraft Teams Up With Licensees

To Speed Supply of Aircraft Engines

"TEAMING UP" with other industries to produce more aircraft engines is not a new concept to Pratt & Whitney. The idea of increasing outside manufacturing was pioneered and developed into a practical system right here during World War II. It worked so well that Pratt & Whitney and its licensees produced almost half of all the horsepower used by Allied combat planes.

And now—at no profit to itself—Pratt & Whitney Aircraft is again building up another team of licensees. In the interest of national defense, this company is sharing the fruits of its research and its hard-earned production knowledge with—

The Ford Motor Company. This company is now bringing into production on the Wasp Major piston engine, which powers the Convair B-26F bomber, the Douglas C-124, Boeing C-97 and Fairchild C-119 transports for the Air Force. Ford has also been licensed to build the big semi-flow J-57 Turbo-Warp jet engine, which will power the Air Force's Boeing B-52 and Convair B-58 bombers as well as other combat craft still under security restrictions.

The Chrysler Corporation. The Dodge division has been licensed to produce the J-48 Turbo-Warp jet

engine and the DeSoto division will build afterburners for the peace plane. The J-48 powers the Navy's Grumman F9F-6 Panther and swept-wing F9F-6 Cougar fighters and the Air Force's all-weather interceptor, the Lockheed F94-C.

Nash-Kelvinator Corporation. Licensed to build the Double Wasp piston engine, which powers the Navy's North American AJ-1 Savage bomber, Grumman Grumman A-1H Corsair fighter and Vought Corsair fighter. This engine also is used in the Air Force's Convair T-28 and Beech T-34 transport trainers and the Chase C-123 and Douglas C-119A and R4D-1 transports, as well as in new large helicopters.

Canadian Pratt & Whitney Aircraft Ltd. This subsidiary of United Aircraft Corporation will build the 600 h.p. Wasp engine in a brand new plant now nearing completion at Longueville, Quebec. The Wasp will power the de Havilland Otter transport and the Canadian-built T-6 trainer.

Supplementing Pratt & Whitney's own greatly expanded production, these outstanding companies will put their manufacturing know-how to work to produce the large quantity of Pratt & Whitney engines needed for the defense effort.

Pratt & Whitney Aircraft



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UNITED AIR LINES has this to say about **THOMPSON TPM VALVES**

Here's further proof that Thompson TPM valves are the greatest advance in aircraft valves in over 15 years.

TPM is the new valve material developed by Thompson to provide greater strength and greater corrosion resistance at high operating temperatures.

Another Thompson-developed alloy gives TPM valves harder wear surfaces on faces and heads. Pinned stems provide harder surfaces to resist wear.



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YOU CAN COUNT ON THOMPSON FOR ENGINEERING LEADERSHIP

On June 12, 1952, Thompson's TPM valves are giving "outstanding performance." In early November, 1950, on a test of seven Boeing Stratocruisers mounting B-4500 engines, OAL experienced 209 unscheduled valve removals. A year later, scheduled valve removals dropped to eight. Thompson's TPM valves have been in use on the B-4500 engine for a single comparable. To date not a single valve has been removed on a TPM valve in the B-4500. Young said.

From Aviation Week
March 2, 1952

(Continued from page 16)
greater performance variations than if the same pilots had been flying against aircraft. Conclusion: Method of presenting performance data to pilots is of great importance.

But conversion of pilots to turboprop aircraft should take only about 12 to 15 hr, says Vickers and this time would include night flying.

Then, were no particular difficulties or traffic, since the controller approached the higher operating altitudes and below speeds. The Viscount from the regular piston-engine aircraft pattern, and was not given preferential treatment. But it was apparent that descent clearance had to be given well in advance of anticipated altitudes.

Normal meteorological forecasts for the 15,000 to 25,000 ft. belt were adequate. But it was found that upper level direction and velocity forecasts were often inaccurate.

■ **Hot and Cold:** Part of the repeated discussions before certification for passenger carrying was stage and tropical trials. The prototype 600 Viscount has been through both since late now, and has been cleared for light stage operations on the coast, standard stage on the extreme and tropical operations.

As a result, the 616 received its full Certificate of Airworthiness on July 25, 1952.

The 700 has recently been through the mill of tropical trials. Cleared for operations based from a low of 550 ft. to a high of 10,000 ft. during the trials. These were the results:

• **Takeoff climb in 4-engine operation:** Gross weight 30,000 lb., flap down 30 deg., landing gear down, winged (185 kt.). Rate of climb—sea level, 1,450 fpm; at 5,000 ft., 10,000 ft.—1,600 fpm at 500.

• **Takeoff climb in 3-engine operation:** (Conditions as above except for air speed). Rate of climb—sea level, 650 fpm; at 10,000 ft.—500 fpm; at 500.

• **Revised landing climb:** Gross weight 27,500 lb., 4-engine operation, flap down 40 deg., landing gear down, winged (100 kt.). Rate of climb—sea level, 1,100 fpm; at 500.

• **Pre-landing approach climb:** Gross weight 27,500 lb., 3-engine operation, flap down 30 deg., landing gear down, winged (180 kt.). Rate of climb—sea level, 550 fpm; at 500.

• **Takeoff performance:** Air temperature 100°, engine out at critical speed of 10 ft. Distance to clear 50 ft. obstacle—1,470 ft.

■ **Current Sales:** Vickers has stated that there are firm orders for 36 Viscounts at hand. Of these, 20 are for BEA, 12 for Air France and four for Aer Lingus. There is also the possibility that BA may take more than 20, the figure was



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tored in the contract is 28. But even after these fine orders, eventual performance is the real payoff on any transport type. After October, a lot of airline executives are going to be watching BSA's balance sheet very carefully. Turboprop transports may see or fall on these results.

Regent Produces Rocket 5-Placer

Production of the Rocket 400 five-place single-engine business plane has begun at the first test of Regent Aircraft, Inc.'s factory in Portland, Tex., 14 miles south of Houston.

Regent is making its pilot run of aircraft in order to achieve type certification of the new Model 400 and has plans for the plane to undergo military evaluation.

The firm has scheduled construction of a 6,000-sq. ft. plant adjacent to the present operations and is considering a conveyor type assembly line to permit production of five units daily. Initial employment is planned at approximately 100, is scheduled to go to 1,000 when the new building is in full production.

Model 400 is a development of Model 200 built only last year. The Rocket 400 has a 400-hp Lycoming engine. It is all metal with a retractable tricycle landing gear. At 14,000 ft., cruise speed is given as 230 mph. Dimensions are: span, 33.5 ft.; overall length, 23 ft.

Rocket 400's gross weight is 3,500 lb. Standard price is approximately \$25,000.

Tin-Plated Glass to Fight Windshield Ice

A windshield designed for electrically heated use has been suggested by General Motors Research Laboratories as a result of experiments with transparent metallic oxide films.

The, for example, can be deposited directly on glass by techniques already known in the industry. By heating the glass near the sulfating point, the tin oxidizes and becomes transparent. Finally the film is washed in water and dried, a step which increases its conductivity.

In practice, this film would be sandwiched between two layers of glass. There is negligible indication of vibrations caused by the film. It has enough resistance to keep the surface of the glass hot enough to prevent icing or frosting over.

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World's biggest bomber—the Convair B-36— relies on PITTSBURGH FLEXSEAL SAFETY GLASS



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From Convair B-36 is the Air Force's "Sunday punch"—the most powerful strategic aircraft in existence today. It holds records for the heaviest load of bombs dropped by one airplane, for the longest high altitude mission.

The "punch" of this mighty striking weapon—the plane's and bombmaker's requirements—are filled with Pittsburgh Flexseal Safety Glass—30 square panes in each B-36, to be exact.

These insulating glass-and-glass Flexseal panes are made in the exact thickness necessary to withstand the pressure and heat without adding unnecessary weight. Slicked metal inserts provide extra strength, prevent flash mounting and ensure a smooth outer surface. Many of the panes involve compound curves that require additional precise tooling.

Forming Safety Glass and glazing techniques for the B-36 is typical of Pittsburgh's service to the aircraft industry. Manufacturers of all types of military and commercial aircraft take advantage of the re-



Insulating components of the B-36 are fused with specially modified Pittsburgh Flexseal.

Detail view of the B-36 showing several panes of Pittsburgh Flexseal Safety Glass.

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1000-1-PT SNCASE jet transport, shown in model form, would have two 4,000 hp thrust jets located behind the passenger cabin, another in the tail. Exhaust then would jet engine in cabin. Flight would be stored behind the cockpit.

New French Jet Liner Studies



SNCASE SO 60 would place out at left show low jet engines in pods set along beneath the swept wings, each pod producing a large engine and a smaller auxiliary power plant. Another engine would support jet forward when operating in hot climates, as from high-altitude fields. SO 60 also features swept wings and tail. These model studies are being conducted by the French Ministry of Civil Aviation as part of a design competition for a medium jet transport. Another design has been entered by Regent. The Air Ministry is expected to authorize further development of one of the models within a few months.

British Cut Back on Brahazon, Princess

(McGraw-Hill World News)

LONDON—The government's decision to stop work on the Bristol Proteus II and two of the three Saunders-Roe Proteus flying boats now being built indicates Britain's big transport program is on the shelf for a long time.

Construction of these five giants already has cost the British \$76 million, with very little to show. They were sitting ducks in the current economic drive. But there is another reason for

the stoppage: the Bristol Proteus II outpacing engine, which was to have powered the Brahazon II and the Princess, has been scrapped as obsolete soon to be superseded by the Proteus III, about 700 lb lighter than the Proteus II and considerably more powerful. Takeoff power of the Proteus III is estimated at 1,600 hp.

Reverses the Program—The Proteus III is being converted for the Bristol Brahazon transport, 25 of which have been ordered by BOAC. The fast Brahazon, powered with a Proteus III, will fly this year. But service editions of the aircraft will have four Proteus III's. The demand for Proteus III's for

the Brahazon is such that it will be a few years at least before one will be suitable for the Brahazon II or the Princess.

One Sea Princess, with two Proteus II's, eight of them completed, will be completed and used for test purposes. Originally, the Ministry of Civil Aviation signed the contract with an eye to supplying BOAC. It was thought, the Air Ministry would use the Princess as troop transport. By June of last year the cost of the project had risen to over \$50 million from the original estimate at \$7.9 million.

Brahazon II, with eight Bristol Centaurus piston engines, is still being used for test purposes. Brahazon II is being stored in the giant shed at Bristol which was built specifically to store the Brahazon. Brahazon II is about half built—on engines or wing ends. The huge shed, which together with a special runway outside, cost the government \$16.5 million, will now be used to assemble Brahazon. Up until recently it was thought that Bristol would set up a production line for the Bristol Proteus yet fighters in the old Brahazon shed. Plans for this have now been scrapped.

The whole Brahazon venture, which was originally estimated at \$12.4 million, cost about \$19.2 million before it was dropped. The Brahazon was built for BOAC, but no order was ever placed.

While few years have not being raised in defense of the Brahazon, there is considerable spirit in aviation circles at the outbreak of the flying boat program. There is still considerable feeling here that the flying boat has a future and many engineers would like to see some action taken to prevent the last flying boat design, Saunders-Roe Long and Short Sea—now being broken up entirely—Not McIlhenny.



"Look here, I know we're travelling faster than sound but please stop answering my questions before I've asked them."

—Scientist studying Starline

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* Ethiopia	73	* USSR	73	* USSR	73
* Finland	73	* USSR	73	* USSR	73

* VICKERS AIRCRAFT HYDRAULICS IN USE

This table includes all nationality marks that have been formerly notified to ICAO up to September 30, 1951. These countries marked with an asterisk have registered commercial aircraft which use Vickers hydraulics. Write to Vickers Incorporated for a 2 1/2" x 4" plastic wallet card which gives you a permanent record of world civil aircraft registration codes.

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NACA Report

Boundary-Layer Flow

Centrally Located Boundary-Layer Flow (TN 2471)—By Franklin K. Moon

The trajectory of the nasal rocket made shows variations in speed and atmospheric properties over its entire path. In analyzing such a trajectory, the important boundary-layer effect in flight and test facilities must be considered as necessary for the entire flight.

This report is a further contribution to the literature of centrally boundary-layer flow. This research, conducted at the Lewis Laboratory of the National Advisory Committee for Aeronautics, considered the case of compressible laminar flow over a semi-infinite flat plate in uniform accelerated flight through still air. Flight speed was allowed to vary with time in a continuous but arbitrary manner. These conditions represent an idealized missile flight.

The analysis shows that a group of parameters are developed whose magnitude determines the nature of the flow characteristics. If these parameters are very large, the classical solution applies for flow starting from rest. If these parameters are very small, the flow may be regarded as nearly quasi-steady, that is, as any instant the motion is nearly that which would be obtained in steady flow at the conditions prevailing at that instant.

Society to Discuss Future of Rockets

The advancement past and the new state of rocket progress will be highlighted at a dinner meeting you can't miss at the American Rocket Society at the Hotel Astor, New York, on Thursday, May 11, 1956.

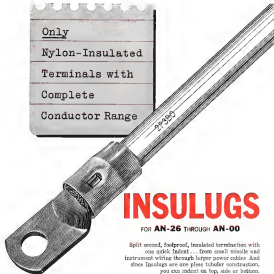
The meeting will mark 20 years of N.A.S. rocket progress that started when the original five members of the Society constructed their first rocket test missile and developed their first liquid-fuel motor.

Looking past to present will be the presentation of the Society's first rocket test stand by Dr. G. Edwards Pendley to Raymond C. Young, president of Rocket Motors, Inc. Young will accept the stand in display in N.A.S.'s museum. And for a look at the future, Dr. Werner von Braun, technical director of guided missile development for Army Ordnance, will describe man's next frontier in space. Dr. von Braun also begins his work with rockets about 10 years ago.

Reservation for the dinner should be made through the Society's office at 29 West 94th Street, New York 18. Subscription is \$7.75 per plate.

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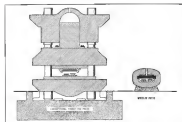


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T-J Riveter used for automatic clinch plate assembly. From this and other data a finished job is shown, including information, etc., including and information.



MIDGET at right, which will do same job in the large unit at left, is a...

Small Press Designed for Big Job

New direct-acting hydropress may replace units ten times as heavy and costing four times as much.

A new hydropress invented by an engineer of an aircraft company probably is the most powerful of currently available presses for rubber-padded forming of aircraft parts. It is small, inexpensive, easy to use, and packs a mighty punch.

Q. A. Wheeler, production design engineer for the Santa Monica division of Douglas Aircraft Co. Inc., developed the press to handle the heavier metal parts specified for today's aircraft.

► **Little Giant**—A little press by conventional standards—about one-fourth the size of the usual hydropress found in aircraft factories—it is a giant for work. It operates at three times the conventional working pressure and reduces the hydraulic fluid passing by about half. Initial cost is expected to be about one-quarter that of conventional presses afflicting the same capacity. Production of the unit is simple, it uses little steel and no critical materials.

The press is small and inexpensive enough to become part of the shop equipment of small subcontractors.

► **Wheeler-Boschard**—Wheeler described his design at a press conference in New York, Apr. 23, the day he received the Wright Brothers Medal from the Society of Automotive Engineers. The medal was awarded for his 1951 paper "Design and Manufacturing Techniques with Titanium."

"It is in a state of transition in air-

craft production," he said, "and it's comparable to the changeover from stick and wire to diemold. We've got to learn a lot of new ways to fabricate parts out of the heavier gauge we are forced to use now."

One of these new ways is exemplified



O. A. WHEELER, Douglas Santa Monica production design engineer who developed new press, recently won SAE's Wright Brothers Medal for paper on titanium working.

in the Wheeler-Boschard Hydropress. It is introduced for the shallow forming of metal, a job formerly done on rubber-padded presses throughout the aircraft industry. Most of the work involved in the manufacture of airplane is done by this process.

► **Forming**—Advances—Boschard, Wheeler's ideas represent an introduction of the rubber-padded process for rubber-padded forming of aircraft parts. The Boschard method, standard practice throughout the aircraft industry, was developed at Douglas in 1933. Its technique is familiar.

A sheet metal blank is placed on a male die, and a rubber pad is forced down over the blank and die. Pressure of the pad on the work forms the metal.

The process is simple and thus inexpensive tooling. There is no spring-back; dies are literally thrown on the press bed but there are drawbacks. You do not get complete forming. You can't get a stress range as a condition. And, job growth here to do a lot of handwork—pouring and trimming—to finish the pressed part to correct dimensions.

These drawbacks were suggested with the trend to heavier metal parts for aircraft parts. Machining and tooling around like the vintage approach to Wheeler and he decided to take another look at the basic Boschard process.

He figured that, righting the rubber-padded with a hydraulically actuated bladder backing up a pad was a promising approach. Structural and cost studies supported his ideas. Early in 1951 Douglas decided to go ahead with a prototype with very low cost—big enough, if the design were right, to do as some good, and small enough, if it were wrong, not to break it.

The pilot model—with a 250-ton. bed—was installed in the Santa Monica production department last January. The first parts were made just a little over three months after construction started.

► **Press Data**—The pilot model operates at 5,000 psi. (Current process normally operates around 1,800 to 1,500 psi) and exerts a total force of 7,100 tons on its bed.

There are no moving parts except the bed. It is loaded in the same manner as the Boschard process press, with blanks placed on male dies. Here there is one difference, however: dies—or any set of dies material—will not stand up on high-pressure runs in the Wheeler press. Aluminum and Inconel dies are recommended, and for the anticipated hot working of magnesium and titanium, steel dies will be needed.



PILOT MODEL of 250-ton press is installed at Douglas Santa Monica plant.

The working pad is 1/4 in. thick of the press is softer and has more elongation than the conventional rubber pad. The reason that pressures on the side of the block are as high as those on the upper faces.

These pads are suggested to protect working pad surface from the sharp edges of the metal blanks.

Production runs with sheet of up to 1/2 in. thickness have been made with the Wheeler press and the results have been much better than the same work on conventional presses.

Floor space for the Wheeler press is minimum, only 5 ft. cooling height is required. The only foundation necessary is one to bring the press to work on a bough.

► **Future Plans**—The unit expected to be most popular with buyers of the press has a 5x72-in. bed. At rated pressure of 5,000 psi, this version rated total force of 80,500. With the possible 10,000-psi. pressure, rated force is doubled to 161,000 tons.

Prototype bed permits 3-in. high die block working depths. This value should be increased, says Wheeler, and the most logical solution appears to



METAL BLANKS of piece T76 aluminum (left) is formed on Wheeler press by K&L die block down over the blank into pads on lower half of press.

be a 4-in. depth on both sides with a scorable section with maximum depth of 8 in.

Because of the metal spring in the construction of the Wheeler press, however, it will get the same total rated tonnage as from a conventional press for about one-tenth the weight at rated cost. Cost of the new press is expected to be not between 10 and 30% of conventional press cost for same capacity.

The Wheeler press will be more featured and marketed under license from Douglas by the Viscosa Aircraft Press Co., Chicago.

USAF CONTRACTS

Following is a list of recent USAF contracts announced by Air Materiel Command.

American Vye Products, Inc., Birmingham, V. 2, printing press, \$1,103,000.
Burns Manufacturing Co., Indianapolis, aircraft seats, 8 contracts, \$91,775.
Boards, Inc., in Chicago, 1000 commercial hardware, \$10,000.

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RUSCO for Safety Belts

Here is another example of Russco's safety belts. It's a standard type for every Russco safety belt. Russco's safety belts are made by the Russco Safety Belt Co., Inc., and are made by the Russco Safety Belt Co., Inc.



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Scallop-Edge Grinding Belt

Designed for automatic pressure grinding and finishing of jet turbine and compressor blades in a single operation, the new Scallop-Edge abrasive belt has been introduced by Minnesota Mining and Manufacturing Co., St. Paul, Minn.

The belt's scallop curve around the edges of the contact wheel, preventing flat spots to be polished on the wheel's edge-crests. Typically, two separate operations—full grinding and root grinding—were required. The belt can be used on crowned, contoured or rounded-edge wheels, or with shaped backup supports, either by machine or by hand.

All standard abrasive belt constructions are available in 15-day delivery, the company says.

PRODUCTION BRIEFING

▶ **Airbus Manufacturing Co.'s** customer service department has been moved to its own quarters in a 13,000-sq-ft building adjacent to Los Angeles International Airport.

▶ **Chase Aircraft Co., W. Trenton, N. J.**, plans gradually to transfer its operations to Wilson Run, Mich. Move will provide additional space and closer coordination with C-125B production flow.

▶ **Lincoln Mercury Division of Ford Motor Co.** has broken ground for Navy 140 production plant near Kansas, Mich. Facility is scheduled for completion next year.

▶ **Monsey Aircraft, Inc., Wichita,** is stepping up Mate 18 plane production to (Continued on page 32)

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4 Billion Passenger Miles

Pan American World Airways Aircraft Division ranked up this record in a single figure period. Pan Americans uses Mobilgas Aircraft, Mobiloil Aero.



10,000 Miles Non-Stop

World's largest and longest-ranging business-line production by Constellation for the Air Force, the Flying Red three products during this special test.



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New two-engine Aero Commander made record flight with one propeller removed—used Mobilgas Aircraft, Mobiloil Aero.



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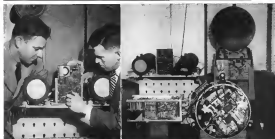
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AVIATION
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NAVE AND RCA engineers examine their latest mapping radar. Photo at right shows complex interior of the equipment.

Navy Unwraps APS-42 Transport Radar

Renewed airline interest in radar focuses attention on improved storm and terrain warning features.

By Philip Kline

The Navy has taken the security wraps off its new AN/APF-42, the first U.S. transport radar specifically designed to warn of dangerous terrain and hazardous weather.

The working is well timed because the airlines are currently investigating radar to help them avoid turbulent thunderstorms and dangerous terrain. Fuelled by Radio Corporation of America, the new APS-42 has an aerial heritage. American Airlines played a major role in developing the original specification for this first transport transport radar, based on tests of the World War II AN/APR-10 (Aviation Warning, Apr. 14, p. 70).

The new radar is designed for ground mapping (navigation) and for displaying ground radar because to permit climb back from. But its major interest is in the field of weather and terrain warning.

► **X-Rang-Like**—In APS-42 predecessor, the APS-42 is an X-band radar, operating at 9,375 mc. Its weight about 175 lb. uninstalled. Height is 4 in.

► **Choice of two beams**, one for mapping and terrain warning, the other for terrain and storm warning.

- **Peak power of 40-50 kw**, compared with the 10 kw of the APS-10.
- **Rail and peak** via stabilization of the antenna beam to prevent distortion of the scope presentation during aircraft maneuvers.
- **Choice of three pulse lengths** and repetition rates for optimum operation under different sea conditions, such as land-approach, weather surveillance, and ground-beam navigation.

Special Report

Before the year is out, airlines of the United States are expected to rush the long-awaited decision on plans to install airborne radar. This would the Navy is announcing details on APS-42, a proven type of radar for transport use. There isn't perhaps better a new air transport capability. To meet the need for an understanding of this air, American Wire's Aviation Editor has prepared a series of special reports on air avionics, of which this is the first.

► **Choice of full or sector scan**, the latter to give better picture clearly during storm-rang search.

► **Quick-disconnect** subassembly construction to provide more maintenance by permitting rapid replacement.

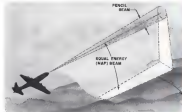
► **Long Aweard**—The APS-42 has been a long time coming. The Houston Corp., Los Angeles, bid low and received the production contract in 1947.

Today, there are hardly more than a dozen APS-42s installed and in service.

In the interim, the radar has indeed gone through many redesigns to improve its performance and reliability and to reduce its weight. Several hundred sets are currently being modified to incorporate recent design improvements.

Houston, which had led in previous radar experience, found the APS-42 program considerably more difficult than anticipated. At the summer of 1950, after the Navy had accepted and returned Houston's initial APS-42s, they told RCA in step to give technical assistance. Because the program was already late, RCA had to suggest quick fixes rather than consider a more complete redesign.

By the fall of 1951, Houston (which had then become the Houston Electric Co.) decided they had had enough and the APS-42 contract was completely transferred to RCA. RCA is now producing the radar as a newly constructed Los Angeles plant.



PENCIL BEAM eliminates ground clutter which is picked up in mapping beam.

► **The Petter-Transport radar's** claim to fame, and its uniqueness among light instruments, is its ability to present to the pilot a picture of atmospheric and terrain conditions beneath and around him.

"Radar leaves the mental strain on the pilot because of his psychological sense of 'being' in the way him look, former pilot-in-command of the AA radar project, gets it. Since we have Air Transport Unit's Air Navigation and Traffic Control division.

The APS-42 is able to give the pilot a better picture of potentially dangerous terrain and weather than he got from earlier radars. These are several major improvements which were developed no later in the Navy AA test program to be incorporated in the APS-42.

► **Two Beams**—The APS-42 presents the pilot with a choice of beam types. This gives the new radar one of its big advantages over the old APS-10 in terms of terrain and weather warning. These advantages are best explained in terms of the older fan-shaped beam used for ground mapping and terrain warning on both radars.

When radar is used for ground mapping, earth, water, buildings, etc., are distinguishable from each other largely because of different intensities in their signal return or echo. This requires that roughly equal intensity echoes be received from similar objects regardless of their distance from the plane.

This can be accomplished by laying down a uniform electric field intensity along the earth's surface, independent of the distance from the antenna. To provide this equi-intensity illumination, the radar antenna forms a fan-shaped beam whose energy varies as a function of the angle from the horizontal to the ground.

► **Plan View**—As the APS-42 antenna rotates in azimuth, the radar scope (now

called the map-azimuth indicator—RAI) presents a plan view of the terrain illuminated by the radar mapping beam. Roughly 115 deg of map-azimuth coverage is blocked out by the fan-beam when the antenna is swivelled so the plane's nose. The plane's position is shown as a small bright dot, called the "nose beam," assembly located at the center of the RAI.

This ground mapping fan-shaped beam can be used to search for dangerous terrain and weather by using a remote control to tilt the antenna and its beam skyward. This technique, at length and with the APS-10, is not too effective.

Echoes from ground terrain are much or completely still echoes from clouds located the same distance from the plane. Furthermore, since the radar provides no information on the elevation or altitude of the reflecting object, the pilot can't tell whether he'll hit or miss it if he continues at his present flight altitude.

► **Pencil Beam**—The answer to these problems is the APS-42's pencil beam, which is usually aimed approximately horizontal or slightly below. The beam illuminates only potentially dangerous objects in perspective, which means those at or near the plane's own altitude.

Thus the pencil beam largely eliminates echoes from low terrain at those times when the pilot is solely interested in using potentially dangerous terrain or terrain at his flight altitude. Low-level radar energy from side-lobe to the main beam could produce false "ground clutter" but RCA uses the APS-42 beam has completely low side-lobe.

If the pilot spots a thunderstorm at his present flight altitude, he can tilt the antenna and its beam to search for storm-level signals at other altitudes. The use of the pencil beam produced

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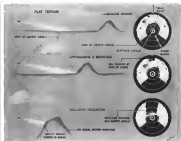
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AS PLANE NEARS dangerous terrain, warning shadow first appears top-left on radar scope. If no crosses appear a take, terrain echo will sound safety cack.

by the APS-42's 16-in diameter antenna is about 4 deg. The pilot can switch from this beam to the mapping beam or vice versa using a remote control which rotates the antenna dish 90 deg about the center of the dish. When the barrel-shaped dish on the antenna dish is in a horizontal position, it directs energy downward to produce the mapping beam. When the dish is rotated, it has an effect on beam geometry and so produces the pencil beam.

The APS-42's pencil beam gives the radar three major advantages:
• Ground terrain echoes which might hide storm echoes are largely eliminated.
• Radar range is increased because the energy is concentrated.

A safety circle is mounted on the RAI which provides positive warning to the pilot when the aircraft is in danger of terrain collision.

► The Safety Circle—When the pencil beam is said, the "beam hang" on the RAI is normally surrounded by a dark area of no radar echo, called the "safety circle." This area shows the safe, clear airspace around the plane at or slightly below its altitude (depending upon beam tilt angle). Safe airspace directly ahead of the plane is shown in the 12 o'clock position on the RAI.

Within the safety circle, a small circle is formed by antenna "spit" energy which reflects from the ground directly underneath. The diameter of this "altitude circle" is a rough indication of the plane's height.

Around the safety circle area may be more gray or white echoes from main beam side-lobe. Beyond that

are the important radar echoes from main beam illumination.

If these radar echoes come from objects considerably below the plane's altitude, as the plane flies toward them, the horizon bright beam echoes move toward the disk safety circle. When the beam loses its radar illumination, the terrain echo disappears—merging, so to speak, with the safety circle area.

Previously dangerous terrain at or near the plane's altitude will continue to be illuminated by the main beam as it approaches the plane. Hence, a light echo will "sound" the disk safety circle area. That is positive warning to the pilot.

From the RAI picture, the pilot can tell whether he can find safe airspace on some other heading at his present altitude. If he must climb, the RAI will indicate when he has reached a light altitude sufficient to clear the obstacle. At that point the terrain echo in the 12 o'clock position on the RAI will disappear.

► Advance Warning—A pilot will normally be able to identify dangerous terrain echoes long before they invade the safety circle. Knowing that he is in a non-coverage area, he will check the periphery of his RAI periodically for the last appearance of the characteristic "shadow" in a normally bright echo area. The shadow can show high terrain which is outside the beam at back of it from radar energy—hence no echo.

When such a shadow first appears along his flight path, the pilot has at least 10 or 15 seconds advance warning—depending upon whether the warning

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THE INDEPENDENCE now uses AP-12

arming of the radar is 50 or 100 mi. (The 100 mi. range is normally used only for ground beacon intercepts.) If the pilot were reasonably certain there were no hostiles in the area, he would suspect the shadow was a sea-schooner like. But he would proceed cautiously, watching to see if the target shifts in front of the shadow reveals his safety circle.

The time available for the pilot to take evasive action after invasion of the safety circle will depend upon the plane's altitude, speed, and the beam's tilt angle. But more under worst conditions, the safety circle provides sufficient time for evasive action.

► **Storm Warning**—The radar also from precipitation is a nuisance in some early rain clouds because it tends to reflect waves when severe. But this precipitation also is the basis for radar's use

'Terrific'

Edisonman of MATS pilots the radar as "terrific." Lt. Col. E. J. Higgins, chief of MATS communication division, says Lawrence W. Higgins is also an Air Force pilot and former active pilot.

Edisonman considers this significant as it is based largely on the performance of the old AP-12. But the utility of even the AP-12 for weather is sufficient to warrant up to an example. Higgins notes, in 1960, Reg. Gen. Harold Hester, now the AP-12 pilot, a month ago, piloting through a storm in the Caribbean. Upon landing Higgins found that he'd flown through a full-fledged hurricane.

Radar is so vital for navigation in Arctic regions, Higgins says, that "the MATS plane is acceptable for Arctic operations unless it can be flown."

fulfill as a weather prognosticator. The pencil beam, in addition for its not warning, is equally useful in storm warning for the same reason.

The radar also intensity from precipitation is proportional to the size of the raindrops. With power of their diameter) and their concentration. Both of these are measures of storm intensity. (The radar intensity) is also a function of radar wavelength and beam diameter, both extremely fixed for a particular radar.)

At the stages of precipitation, when microdrops are a misty mist and the drop concentration is light, the RAI shows a light haze, which fades around the more solid storm center. To spot heavy precipitation, the pilot adjusts his APS-42 receiver gain so that only the most intense rain area of the storm shows up, he then flies to avoid these storm areas.

Intensity or Gradient?—There is some data which indicates that the degree of turbulence in a thunderstorm isn't necessarily related to the intensity of

swirl. Radar gradient is the real villain among turbulence. American Airlines' later tests led them to conclude, at least tentatively, in an area where rate of change of swirl rate (gradient) changes rapidly, they found, a pilot will usually run into some turbulence.

Since rainfall gradient is not directly discernible on the radar RAI without much "playing around" with the receiver gain, perhaps the clearest picture with the APS-42 is to fly around the storm, if possible. But that isn't always practical, particularly for military aircraft. Even so, here coverage which cannot reach maneuvering. It will be even less feasible in jet transports where fuel consumption is high.

In their Navy tests, AA has open a novel method of displaying rainfall gradient on the RAI. If gradient is the important criterion of turbulence, this feature would permit a pilot to pick "soft spots" through a storm instead of flying around it.

The new technique, called Isocho-

AN/APS-42

Operating Characteristics

Ranges 5, 10, 30, 130, and 200 miles

Range Modes 2.5, 5, and 25 mi.

R.F. Operating Frequencies

Transmitting 9,375 (±51) mc

Receiving (search) 9,375 (±51) mc

Receiving (beam) 9,375 (±11) mc

Pulse Power 50 kw

Pulse Repetition Rate and Length

Search (1, 10, 30 mi.)

600 pps., 0.75 microsec

Search (100, 200 mi.)

200 pps., 3.5 microsec

Weather (all ranges)

120 pps., 3.5 microsec

Beacon (all ranges)

600 pps., 2.25 microsec

(*Pulse peak power)

Beam Dimensions

Approx. 5 deg. in horizontal plane,

7 deg. in vertical plane, measured between half-power points

Antenna Scan Rate

Full Sector

1, 10, 30 mi. 40/min. 90/min.

100, 200 mi. 15/min. 15/min.

Weight Approx. 175 lb.

Power Consumption

3,000 va., 400 cps., 100 v.,

200 watts 28 v. d.c.

Indication (2) 5 in. CR tubes



COLLINS DEMONSTRATES ITS DEMONSTRATOR

Collins Kollsman C-12 Twin Hawk demonstrator for new integrated flight system and built radio equipment located with a variety of antennas: (2) weather and VOR, (3) VHF communications, (4) radio compass loop, (4) new VHF communications, (5) radio compass "beam" antenna. Tholens is also another antenna, located in the nose

for ILS guidance. The cockpit has a dual indication of the company's new flight system. Top screen panel to approach horizon which presents airplane attitude and complete information needed for an ILS approach. Lower screen panel to course indicate which displays magnetic heading and a pictorial presentation of plane position.

contouring, we developed two kits to go into the APS-42. The military have adopted a "wet and wet" attitude in air in building the defense into their APS-42.

However, the system may mount on no-echo containing in sea radar they too. Operating details of this new technique will be discussed in the next article in this series.

Storm or Mountain?—A problem arises because raindrops show considerable radar except as well as reflecting some of it back to the antenna. Because of the atmosphere, the radar beam cannot pass through heavy precipitation, and thus creates a shadow in back of the heaviest storm echo.

If the pilot is flying in a mountainous area, and if the precipitation atmosphere is heavy, the storm echo in front of the shadow can look like a mountain ridge with its characteristic shadow. If, in addition, the storm has heavy rainfall throughout, giving a rain-holding echo, the pilot may be unable to distinguish a storm from a mountain.

In their Navy tests, AA devised a technique for effectively discriminating between storm echoes and mountain echoes. The method required the necessary horizontal polarization of the antenna beam to be momentarily changed to circular polarization. But like Isocho-

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If it is another feature which the airlines will probably want in any color they buy, it will be discussed in more detail in the next article in this series. Richard The Strong, the strong at treatment of color theory by color, makes the dangerous prospect that a situation may be looking behind a threshold without going to a winning edge on the RAI. A period solution to this problem is to increase color power.

The peak power of 40-50 hp, used in the AF542 is a four-fold increase over the old AF510. This should increase color quality to be about 95% clear which is required for

AF542's storm penetration abilities to ensure to be seen.

■ **Beam Stabilization:** Roll and pitch are stabilization of the AF542 beam represents a considerable advance over the established AF510. Of the two, roll stabilization is the more important, particularly for ground mapping and horizon navigation.

Without stabilization, the RAI picture becomes unusable when the engine banks for a turn, slowing the beam proportionately. With stabilization, the pilot can maintain his track by watching the RAI and know exactly how to land on.

In the AF542, roll and stabilization

For VIPs

Mr. L. C. Hession who first flew the Vought and other VIPs in a MATS C-119, says the AF542 is a "real improvement. He tells Air Force West that "we can go right through low clouds with built-in visibility."

When Hession and his wingman, Capt. Jack Bledsoe, who operates the AF542, joined an aircraft carrier in a mission to the Korean Peninsula, Hession says, "we can make a confident straight-in landing using our color."

of the beam is achieved by physically rotating the antenna dish and its waveguide through an angle proportional to the plane's bank angle.

Pitch stabilization is a more delicate feature, it takes out secondary pitching movements of the plane without displacing the beam. But pitch stabilization is not absolutely necessary to correct for long-period changes in the plane's pitch angle. The antenna dish control can be used manually to adjust the beam pitch angle.

In the AF542 design, where roll stabilization is required, the pitch stabilization adds little in the way of cost or complexity.

■ **New Supplies:** With AF542 available from all five-engine military transports, Boeing's Douglas Pacific division and Allen B. DuPont Laboratories are setting up to produce the new color. The Navy says all AF542s used by the military, although the Air Force gets most of the sets.

DuPont supplies the Navy with AF542s and Boeing supplies the USAF with AF542s, with KCAs turning out AF542s for the USAF. The Boeing and DuPont units have slightly different internal "packaging" and by-products from the RCA's. Boeing, engine assemblies, such as the antenna, eye cameras and sets, are operationally interchangeable, regardless of the manufacturer.

RCA expects that the current production, in production after April, will give the performance and reliability the military has been seeking. Certainly the design will have benefited from the considerable field experience obtained in service tests in a dozen of the carrier services.

A "new school" of thinking among airline radar experts expects the AF542 as an essential aid to air war. Their view, and the change of view of new strike radar they want will be discussed in next week's article.

EQUIPMENT



DOUGLAS DC-6As, 25,000 ft. capacity helps boost Slick Airways' business.



MC LOADING DOORS make shipment of heavy and bulky freight easier.

DC-6As Boost Slick Cargo Volume

Carrier now flying more and more heavy machinery in each new freighter up business 600,000 ton miles.

By George L. Christies

Beach, Calif.—The Douglas DC-6A is slowly but surely changing the character of Slick Airways' freight operations. Light and heavy shipments, including machinery, are growing in increasing share of the carrier's business, shifting the emphasis from former and clothing.

The growing diversification of cargo, the new equipment and new markets will help stabilize its business, Slick feels, reducing seasonal freight fluctuations.

Reason for the change is the growing volume of the first designed for the purpose air freighters to be used in the U. S. Its 25,000 ft. capacity and large loading doors make the handling of heavy, bulky equipment feasible. In

addition, it offers greater speed, long range, and increased passenger and cargo capacity.

■ **Big Shift:** Impact of the DC-6A on the carrier's overall business is indicated by the fact that Slick's cargo business has climbed about 600,000 ton miles with the addition of each of its three DC-6As. Three more of the freighters will be delivered in the first quarter of 1955.

More the new plane is changing the character of Slick's shipments can be gathered from this:

■ **Flowers and other lightweight commodities** now make up only 25% of the company's totalized business, whereas they used to represent 50% (but the total volume of Boeing cargo has gone up).

■ **Heavy machinery, electronic equip-**

ment, pharmaceuticals and machine parts have displaced clothing from first place in totalized shipments.

Such much heavy machinery can be shipped safely by an efficient heavy and expensive shipping routes. Thus a customer often may get the advantage of freight's speed at a lower cost than he would pay for ground transportation.

■ **Big Push:** Slick officials claim to have earned the lowest single shipment ever. They stalled a 32-ft. tie and weighing 25,000 lb. in a dock and loaded it from Philadelphia to Burbank overnight with one stop at Kansas City.

And Slick points out that increased payload weights soon to be allowed for the four-engine freighters will extend the ship's capabilities. A maximum gross takeoff weight increase from 120,000 to 182,500 lb. will be allowable with the R2M3C16 engines in use in the existing fleet (to date experienced) aerodynamic principles are not into use. A further increase to 197,000 lb. is expected when the engines are used as CB17s (this simply means using a fuel of 100 octane rating, or better without any modification to the engine). Because of such increases in payload weight will be that Slick can operate further. Groups in return markets, everything Korean City.

(The DC-6A delivered to Slick is restricted to 160,000 lb. because of structural considerations.)

Index of why the plane is so popular with Slick is this performance which Slick, under a second lease May 1954, and with a limited supply of pilots, the airline completed all scheduled routes to coast (with no exceptions). The schedule was three months in a row.

■ **Around the Ship:** A tour of Slick's main overhaul facilities in Burbank is worth many interesting facts of a freight carrier's operations and the reasons why some problems are solved.

■ **Crash test:** Cargo and machinery problems when a freighter crash-lands. In case of sudden stoppage, heavy cargo can break free, hit the fuselage, crash through the forward bulkhead and into the flight deck. Slick's way of preventing this is to install a crash cut against the rear line of the bulkhead at Section 122.

Spill valves release material from about twenty attachment points around the fuselage and attach to a central heavy steel ring around 15 in. in diameter. For catastrophic failure, or heavy landing complete the structure.

The crash cut, located for a 10,000 lb. load at 60, will release forward

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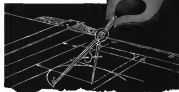
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1	100	100	100	100	100	100	100	100	100
2	100	100	100	100	100	100	100	100	100
3	100	100	100	100	100	100	100	100	100
4	100	100	100	100	100	100	100	100	100
5	100	100	100	100	100	100	100	100	100
6	100	100	100	100	100	100	100	100	100
7	100	100	100	100	100	100	100	100	100
8	100	100	100	100	100	100	100	100	100
9	100	100	100	100	100	100	100	100	100
10	100	100	100	100	100	100	100	100	100
11	100	100	100	100	100	100	100	100	100
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75	100	100	100	100	100	100	100	100	100
76	100	100	100	100	100	100	100	100	100
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79	100	100	100	100	100	100	100	100	100
80	100	100	100	100	100	100	100	100	100
81	100	100	100	100	100	100	100	100	100
82	100	100	100	100	100	100	100	100	100
83	100	100	100	100	100	100	100	100	100
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93	100	100	100	100	100	100	100	100	100
94	100	100	100	100	100	100	100	100	100
95	100	100	100	100	100	100	100	100	100
96	100	100	100	100	100	100	100	100	100
97	100	100	100	100	100	100	100	100	100
98	100	100	100	100	100	100	100	100	100
99	100	100	100	100	100	100	100	100	100
100	100	100	100	100	100	100	100	100	100

Height in inches.

SIZE OF CARGO: Six's DC-4s can load a plane by the most loading table.

loading load, then crash in the loading of cable attachment points before it leaving cargo to move into the cockpit. The fuselage will bend, but the crew stands a good chance of walking away.

Also, Six's loads in cargo right up to the forward bulkhead, to prevent load from getting a "running start" in case of sudden stops.

• Door stiff. Loading heavy cargo into the DC-4 caused damage to the door sills. This is solved in a DC-4A because it is guaranteed and any structural damage causes cable penetration leakage. At maximum cabin pressure differential, 19.5 tons push against the doors.

• Six's engineers devised a self-protector consisting of two 1-in. plywood boards mounted at right angles to a heavy aluminum flange running the full length of each door. The self-protection is designed to fold out and down, guiding the side of the fuselage door lock left and tractor during loading, then folding into the fuselage as door can close tightly. The action thinks it is a simple but strong method of protection.

• Floor worry. In connection with other freight carriers, Six's cargo strong but lightweight floors. Heavy cargo tears up even the best flooring material. "Not that the original floor did not do what Douglas and they would do," said a Six's engineer, "but we simply have to have sturdier floors without an unreasonable weight penalty."

First flooring trial was a paper laminate mounted on aluminum, like bus floors. The laminate gave good vibration resistance, but the floor was not stiff enough and deflected under load. So the laminate cracked and broke up.

Plywood floors in a truck were tried but splintered. Replaced with 1-in. plywood, they held up. But the weight penalty is about 150 lb. per sq. ft.

• Better loading. The jacking of the fuselage now is done with a fiber glass laminate called "V" board. It gives good service and is quite puncture-resistant. It weighs in at 10 lb. Six's could save \$50,000 by using it only up to window level to protect the floor.

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FOR AND Safety AND Dependability

PIASECKI USES NICKEL ALLOYED STEELS



(A) The HO4S type helicopter is a product of Piasecki Helicopter Corp., Meriden, Pa. It is leader in the development and construction of helicopters. Piasecki is now building the world's largest unit of this type, designated the RH-14 for the U.S. Air Force.

(B) Forged nickel alloy steel rotor hubs and spar tubes at a Piasecki helicopter. Nickel alloy steels, heat treated to provide an optimum combination of strength, toughness and wear-resistance, are used for these and other major components.

The good performance of Piasecki Helicopters attests to the dependability of nickel alloyed steels for transmission shafts, rotor hubs, spar tubes, drive shafts and other vital parts.

Type 4340 nickel-chromium-nickel boron steel, having 130,000 p.s.i. minimum tensile strength, is used for some 90 per cent of the forged components as well as for many parts fabricated from bar stock.

Transmission gears are made from type 5012 steel (31½% nickel-1½% chromium) to assure a strong, tough core along with a hard, wear-resistant case after hardening.

Practically all bolts for these craft are type 2339 steel containing 31½% nickel, heat treated to provide 125,000 p.s.i. minimum strength with toughness.

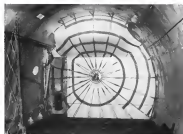
Free walls, oil tanks, exhaust collectors and allied parts that must combat corrosion and heat utilize A.I.S.I. Types 302, 302i, or 307 stainless chromium-nickel steels.

Also, in producing the Continental R-970-M and the Wright Cyclone R-1820-T6A...engines that power Piasecki helicopters...it is common practice to use crankshafts, connecting rods, gears, bolts, studs and various other parts made from heat treated nickel alloy steels, for maximum assurance of safety and dependability.

At the present time, the bulk of the nickel produced is being diverted to defense. Through application to appropriate authorities, nickel is obtainable for the production of engineering alloy steels for many end uses in defense and defense supporting industries.



THE INTERNATIONAL NICKEL COMPANY, INC. 37 WALL STREET NEW YORK 5, N. Y.



CRASH NET is designed to protect crew from forward-slinging heavy cargo.

lags ends, and replacing it across the top of the plane with lighter stuff. Problem is that "V" board serves as fastage reinforcement and shoving it may reduce permissible maximum loads on cabin side cargo tie-downs right as much as 75%, according to Slick experts.

■ **Antaric Aircraft.** Slick is out to trim every pound of extra weight off its DC-6As and make every cubic foot of space available for cargo.

Passenger accommodations are one for passenger planes where pop heat can annoy passengers. We don't need them on cargo craft, says Slick. So off they come, and 15 lb. from \$2,500 will be used on each of the new ice-bedeviled 6As.

Tether facilities for engine and cargo port, flights are not seriously long. Forward bulkhead has been replaced by those in the cockpit as possible to give completely unobstructed cargo area to rear passenger bulkhead.

Fire-strengthened grid pattern is laid out so seats may be installed if required. Escape routes are shown in the line logs above the doors and emergency exits. Red cloth tape identifies them.

■ In the Cockpit. The only difference between the DC-6A cockpit and that in passenger 4s is that here the cabin temperature control panel is installed above the cockpit.

Good flight instruments are all-electric, except for one vacuum-driven turn and bank indicator. Pilot has one of each, co-pilot has electric indicator.

Instrument flying aids for the pilot include the Bendix Omirac MN-97. Slick officials say pilots' reaction to the Omirac is enthusiastic. Co-pilot has standard voice pointer indicator.

The Specy A-12 autopilot is in-

stalled in the DC-6As. Slick experts expect the system that the A-12 is slightly more flexible than other autopilots. And they like the directional portion of the equipment—the Gyroscop compass.

■ **Flame Tolerant.** F. F. Pratt, long a pilot for Slick and now assistant in the paint dept., T. L. Glass, told Aviation Week that the DC-6A, basically, has proved no problem to his company. Total hours accumulated on the fleet to date are approximately 160,000. The airframe and most of the systems, including hydraulics, pressurization, landing gear and wing flaps, have given little or no trouble. The electrical system has caused some concern, he added, and this is attention reflected in an imminent inspection.

■ **Maintenance.** General's Hydrolac non-flammable hydraulic fluid is used in both the cabin emergency drive and main hydraulic systems. Slick maintenance personnel are happy about its performance. Hydraulic pump life is improved because of the fluid's excellent lubricity and leakage problems are negligible, they say. May have any potential squawks have registered. Pratt says his "few the last few on overhauls and wrote up only one major brake lock." Gas atmosphere airtightable as Hydrolac, according to Slick, is its pressure-maintaining quality.

■ **Fuel.** Like the heavy automatic approach computer that got the A-12 autopilot to the H-5 landings and glide path beams. There is some concern, however, that airport maintenance may be shut because of recent accidents. The ability of automatic approach computer thrusters with rising consciousness.

■ **Slick is testing Thompson.** Aircraft Tire Corp.'s stored tank occupant

Although it is too early to report a firm opinion, preliminary indications are that the tire will give longer life.

■ **Gasoline.** Several things will web better and in the DC-6As an air-gating pump service, the airline reports.

■ **The engine fleet of DC-6As and C-46s is being tested for the Scudex quality analyzer.** The C-46s will use the instrument as a portable unit, in the 46s it may also be used in its airborne unit.

■ **Oil collection in the C-46s are being changed to Clifford equipment.** Ben

can cited by the carrier's maintenance personnel are that the Clifford filter is light, responsive, and easy to repair and maintain.

■ **Aviation hours exclusively are used in the C-46s powerplant inventory system, except for Ford's vacuum drums and engine overhaul unit logs.** Slick says this configuration is trouble-free and lends desirable safety qualities.

■ **Low-pressure underdeveloped CDA release system in C-46s prevents under 175% of cylinder pressure time because "jugs" can be pulled without disturbing the CDA setup.** The extinguisher is so-called under 4 in. instead of 5. The lower portion of a fire breaching the engine between the rear row of cylinders and the fire and. Nine 1/2 in. lines take off from the circle and carry the CDA forward between the cylinders.

■ **To allow quick and correct when reporting drive shaft alignment when installing overhaul engines on the DC-6As, Slick designed 1 in. guide pins.** Used on the lower engine installation, the pins allow the engine to be mounted while keeping the upper shaft drive shaft properly aligned.

■ **DC-6A helicopter—Here in New York has worked out some of its maintenance problems.**

■ **Jack and Thelma inventors on DC-6As overhauled and tested, in fact the electric blowers designed to cool the seats.**

■ **Colville delivery system** has been the largest licensee on the DC-6A engines. Some 40 jugs have been changed on

RCA *Richard* **Parker**

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CASTLETON ON HUDSON, NEW YORK

the fleet to date. Most were due to exhaust valve and exhaust valve guide failures. Sick operates its CR6s engines at 1,150 hp until fuel consumed brings the plane's weight down to 92,190 lb. Power is then reduced to 1,130 hp for the remainder of the flight, Sick says. Average true air speed at these powers is 285-290 mph.

Another nuisance associated with the engine installation is frequent cracking of oil cooler and exhaust air cooling ducts.

Two C-46 engine problems have been linked by Sick.

• Heavy case leaks were stopped by using an R1300CA ring on No. 1 and No. 3 Aviaton Perseus pistons.

• Cracking and wear of General Electric magnets besides past cases caused excessive wear on the ring followers. Recently was to replace cam with a ground cham and bush-chamming the case.

Though Sick's main overhaul here is here in Burbank, it still maintains its engine overhaul shops at Evans. That facility takes out 45 R200075s a month, 10 of its own, too for the Flying Tigers and five for Civil Air Transport of Panama. A substantial number of USAC R1300s also go through the shop.

United Airlines evaluates the current DC-6A engines at the moment.

Aircraft indicates in the last year went from 7.8 to 8.3 hp. Miles down jumped 50% to 12,750,315. Maintenance costs were substantially reduced by shaving by 10% the number of hours flown by all aircraft between periodic maintenance checks.



SPOTS FUEL SYSTEM LEAKS

The portable, portable device, originally developed by General Electric to detect leaks in refrigeration systems, is being used by North American Aviation, Los Angeles, to check aircraft fuel cells for leaks. It is designed to detect openings as tiny as only 1/800 in. of an oval shape in a wall. It is sensitive to hydrogen, which NAA engineers agree is the simplest, easily fed gas and flame maintain under a specific pressure. The GE device is then run over the system.

Airport Fire Control Techniques Studied

Airport firefighting techniques that enable fire crews to work their way into burning plane nose and wing and view views highlighted the aviation safety discussion during the recent 22d annual Greater New York Safety Convention.

Capt. James Kelly, Port of New York Authority, showed a color film depicting NYFA fire crews at Idlewild International Airport going through one of their drills—the drill out the Authority approximately \$2,000 annually.

NYFA has a specially built fire truck (Walter PECO chassis and Messing body) and "mouse" unit which can provide approximately 30,000 gal of foam blanket. Also available is an 800-lb. high-pressure carbon dioxide system.

NYFA crews are trained not to waste time trying to quench the entire blaze—instead cut a hole north to the cabin in a matter of seconds, permitting them to enter and remove occupants. Saving the aircraft is a secondary consideration.

The truck is to lay down sufficient material to douse fires without wasting time filling it on too thickly.

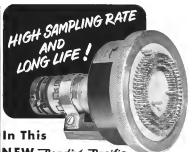
Basic graphic description of how work can be completed by wearing pressurized safety glasses and avoiding serious foot injuries by wearing safety shoes were shown in a series of slides made by Grumman Aircraft Engineering Corp., Bethpage, N. Y., Grumman Safety Division Robert Moore showed need for providing aircraft during landing operation.

Stewardess' responsibility for detecting and rapidly making correct diagnosis of sudden deaths of illness among her passengers was covered by Mrs. Ann Pick, assistant supervisor of stewardess service for American Airlines system.



"How will we explain this? The standard was only TWO of them!"

Excerpted Aviation News



In This NEW Bendix-Pacifc TELEMETERING COMMUTATING SWITCH

Commutations of telemetering subscriber oscillator input voltages or pickup output at high sampling rates can now be provided with the new Bendix-Pacifc TSC-18 Commutating Switch.

The TSC-18 Commutating Switch is a three pole switch having 60 contacts per section and shorting type contact wipers. Non-shorting type operation may be obtained by substituting alternative contacts giving 30 contacts in each section with 80% duty cycle. The wipers are adjustable for synchronization of all sections.

Long life has been engineered into the switch through the use of heat treated precious metal contact plate and wipers. The contact plate and wiper are completely enclosed in an aluminum housing which is attached to a small permanent magnet motor having an integral gear train and governor.



SPECIFICATIONS

Motor Voltage: 4, 12, or 18 volts DC.
Motor Current: 300 to 500 ma.
Capacitors: 40000 p.p.s. 2.0 mfd.
Max. rate: 100 p.p.s.
Base to middle slip ring: 10.2 mfd.
Outer to inner slip ring: 16.2 mfd.
Temperature range: -50°C to +100°C

Availability: Delivery in 45 to 60 days.
Warranty: Indefinite in 50 G of a frequency of 10 cps or 100 Hz.
Housing: 100 p.p.s. slip ring.
Mounting: 1/2 inch diameter.
Weight: 1.5 lbs. points.

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CROSSOVER EXHAUST stacks (arrow) give TCA passenger a quieter ride.

TCA Cuts Noise on its North Stars

Carrier reworks engine exhaust system to produce a quieter plane; entire DC-4M fleet to get treatment.

By Henry Lefler

Montreal-Toronto-Canada Airlines is going after its share of the growing air travel market with a reworked, quieter North Star. The redesigned DC-4M also seats eight more passengers—a total of 48—at no sacrifice in comfort (Aviation Week Apr. 25, p. 17).

Right now the last of the new engine is flying on the New York-Montreal run, but as the remainder of TCA's 25-plane North Star fleet gets the sound-plus-quiet treatment, the transports will go into service on all of the carrier's long-range routes, including the Atlantic coast service.

Development of the noise-cutting system has cost TCA over a quarter of a million dollars to date, and will cost at least that much again before final noise certification is completed in September.

► **Noisy Star**—TCA has long been aware of the noise problem as its Canadian North Star fleet continues complaints would not let the airline forget it, even if the company had been as relaxed. The liquid-cooled Rolls-Royce 602s, which deliver 1,580 hp each to the four-engine transport, dump part of their exhaust on the forward side where it impinges on the cabin, making for a loud and at times uncomfortable ride.

But TCA wanted to stick with the 602s—a proven adaptation of the wartime Merlin—because of its faith in the engine's reliability and the belief that a liquid-cooled powerplant was best suited to the carrier's operations through extremes of temperature.

So efforts were directed to quieting, rather than replacing it.

The solution—a re-engineered exhaust system to direct the engine blast away

from the cabin—has cut the noise level at least 50% on the prototype installation, which has now reached up 400 ft.

The noise reduction ranges from 6 decibels overall to 15 decibels in the speech frequencies. The difference between the standard DC-4M and the plane equipped with the new system is readily apparent to the passenger. Certification is easily carried as no special tests at the reworked North Star.

► **Not Easy**—Solution of the noise problem was simple, but it wasn't, according to J. T. Dwyer, TCA's director of engineering. Work began back in 1964, with Rolls-Royce and Canada's MacCloskey Co. working on a design of a "Merlin W" or "Mac" MacCloskey, the author's appellation of job methods and development, finally hammered out the present system by last June.

The new definition is to be accurate when the high temperature of the exhaust gas flows to the aircraft's exhaust temperature of 1600°F, the 250 mph velocity of the exhaust pulsation, and accuracy of mounting on fuselage and construction joints of engine and manifold. Early designs which managed to get the noise down could not stand up structurally. Industry opinion was that the problem was not readily amenable to solution, but TCA-Canada decided to continue with the work.

MacCloskey's design increases the size of the ducting carrying the exhaust gas exhaust. Previous ducts had spread the same gas in as six-cooled engines, to take advantage of ejector thrust. While the larger size lessens that thrust, it makes up for it in a quieter noise level and reduced exhaust temperature. The new system keeps the exhaust about 300°F (at cruise) to 400°F (at

takeoff) below the standard's critical temperature.

The new stacks will suit 30% more than the old type, but TCA expects to be paid back, not only in improved passenger comfort and a better competitive position, but through reduced maintenance.

► **High Performance**—The weight penalty attached to the new system is 75 lb per engine—fairly low compared with the Merlin engine's overall weight of 3,600 lb—and this is recovered through improved performance of the redesigned cooling. Speeds of the engine North Star and the standard plane are just about even.

Although the new installation is more complicated than the old type exhaust stacks, accessibility to engine units has not been much affected.

While the prototype set of four exhaust assemblies was tested out by MacCloskey himself, TCA has contracted with Canadian Air Production to equip the remainder of the carrier's 25 North Stars. In addition, the Royal Canadian Air Force and British Overseas Airways Corp. have shown an interest in the noise-treating TCA-Canada hopes that outside sales will help pay back part of the development cost of the unit.

► **More Quiet**—The prototype installation is flying on TCA's new 45-seat high-density North Star. The gain in quietness has come from moving the main noise to the rear, where it is added to the fuselage noise emanating from the engine, thus reducing the noise level at the cockpit, behind the cockpit, from its usual spot opposite the passenger entrance. The reworking has actually resulted in more noise between rows.

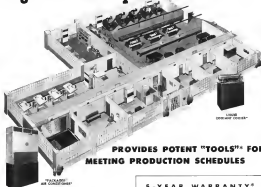
The new seating arrangement provides 15 rows of double seats down the forward side of the plane, over a row of four seats on the opposite side, giving on the part side and rear, including a forward-facing pair of seats, all of the quiet.

Lightplane VHF Transmitter

A new small VHF transmitter for lightplane use, meeting the requirements for reliable operation at range stations has been developed by Air Communications Co. Working only 24 in., the new unit must be used in conjunction with a LP radio receiver.

The transmitter claims frequency stability of $\pm 0.05\%$ for the six crystal-controlled channels which operate between 122.1 mc and 122.9 mc. At favorable altitude, the unit is said to have a range of 75 mi. Air Communications Co., 23 Main St., Shelburne, N. J.

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Light Couplings for
Missiles, Planes

Two new couplings for aircraft and missile applications have been introduced by E. B. Wiggins Oil Tool Co., Inc.

One of the flexible coupling products introduced last summer had an air seal. This is a lightweight part of the coupling that is installed after tubes are in place. The seals need to be large enough to stretch through which the line is worked. The coupling permits misalignment up to 3 deg. and separation of tube ends by as much as 1 in. without leak. The line pressure is rated at 775 psi and temperature range -65 to 400° F. The new coupling promises to be the answer in many cases where vibration and flexure on rigid tubing creates connection problems. The coupling has

The second coupling, manufactured by the firm, for marine and rocket applications, is an extending type having solidifying valves in each half. The joint is designed to prevent spillage of dangerous, corrosive fluids used in rockets when supply lines crossing them are disconnected. The coupling is all-diecast, keeps air from getting into the system.

As an added precaution, the coupling cannot be disconnected until the shut off valves have been manually turned by means of the handles provided externally on the unit.

Made of stainless steel, the part will withstand temperatures from -512 to $+600^{\circ}\text{F}$. Those currently in production fit 1 and 1/2-in. pipe sizes.

K. B. Wiggins Oil Tool Co., Inc.
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21, Calif.



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Some Things Are WORSE THAN STRIKES

This editorial which appears in McGraw-Hill publications was written just prior to the resignation of Charles E. Wilson, as Director of Mobilization. The principle it discusses is of basic and continuing importance in our struggle to maintain economic and personal freedom in America.

It is to be hoped that the managements of the steel industry will resolutely resist the efforts of the national Wage Stabilization Board to force them to establish the union shop in their plants. In essence, the union shop means compulsory union membership.

They should resist not because of any financial advantage to the owners of the industry. There would be none. They should resist out of a decent regard for those ideals of our country which we are now fighting in Korea to protect. Moreover, their resistance would, as a matter of fact, benefit the leaders of the organized steel workers by protecting them from the certain and bitter fruits of their "victory" in getting the government to impose the union shop on the steel industry. Their successful resistance would also prevent Premier Stalin and his co-workers from enjoying a hearty laugh at our expense.

Fun for the Russians

This is why the Politburo would find the establishment of the union shop in the steel industry, at the behest of the Wage Stabilization Board, so profoundly amusing. We are fighting in Korea because we believe that armed aggression, promoted by Russia, menaces our freedom. And we are spending hun-

dreds of billions of dollars here at home for armament to protect our freedom at other danger points. When this armament program is threatened by a crippling strike, the federal government through its Wage Stabilization Board proposes to buy off the threat by plowing under a vital element of that freedom which we are trying so desperately to preserve.

When the union shop is adopted through voluntary agreement, as it has been in cases covering millions of workers, it deeply undercuts the freedom of the individual. To hold his job he is required to join the union and support it financially whether he wants to or not. In the case of such voluntary agreement, however, the government takes no direct part in thus destroying the freedom of its citizens. It is essentially a private transaction.

Tyranny is the Word

But in the steel case the federal government becomes a party to a direct attempt to impose the union shop. Instead of protecting its citizens in their right to earn a livelihood, the government forces certain of them to join and support a private organization which they have clearly indicated they do not want to join. This they must do to hold their jobs. Tyranny is the accepted designation of government coercion of this kind.

It may be objected that the Wage Stabilization Board merely recommends the union shop, does not order it. This was also true of the action recently taken by a President's Emergency Board, which also "recommended" that working agreements between the

TAKES ITS G's WITH A GRAIN OF SALT...

Intensely, a few grains of salt in the form of human nature, cockpit have helped prevent complete loss of control of supersonic flight. For those who know it all the best of a new Pacific Pacific maritime aircraft, which represents a new generation of maritime aircraft.

Boeing Pacific standard instrumentation, weather, radar equipment, radio control systems, voice communication and other electronic devices are making a real contribution to the rapid development of aircraft and ground systems. The industry of these products has been achieved through a variety of design, technology and other components. To ensure that the Pacific Pacific for the future, more than 400 people are

working on the company's well-known Pacific Division. Technology included among many important projects is a new Pacific Pacific maritime aircraft.

Your company, as well as Pacific Pacific's, is a diversified company. Substantial engineering resources in the field of electronics, electro-mechanics, structures and hydrodynamic research.

Pacific Division

Boeing Aircraft Company

Boeing Aircraft Company

Boeing

FINANCIAL

Interim Aircraft Results

	First Quarter Ended June 1951	1951	Income
North American Aviation			
Sales (000)	\$52,695	\$74,667	\$4.7%
Net before taxes (000)	5,614	3,902	25.1
Profit margin	6.9%	5.2%	
Net after taxes (000)	\$1,375	\$1,135	\$5.0
Profit margin	2.6%	1.5%	
Earnings per common share	\$0.40	\$0.30	\$7.0
Douglas			
Sales (000)	\$51,491	\$76,510	166.7%
Net before taxes (000)	5,231	3,902	59.8%
Profit margin	6.7%	5.2%	
Net after taxes (000)	\$1,897	\$1,612	10.7
Profit margin	3.7%	2.1%	
Earnings per common share	\$1.60	\$1.40	\$8.7%
Republic			
Sales (000)	\$66,413	\$79,458	241.7%
Net before taxes (000)	4,519	1,617	266.1
Profit margin	6.8%	2.0%	
Net after taxes (000)	\$1,417	\$460	213.1
Profit margin	2.1%	0.6%	
Earnings per common share	\$1.15	\$0.40	213.1
Boeing			
Sales (000)	\$70,510	\$81,875	128.6%
Net profit after taxes (000)	936	709	139.5
Profit margin	1.3%	0.9%	
Earnings per share	\$1.35	\$0.90	139.5

Aircraft Sales Trend Continues Up

Quarterly reports show accelerating rates of deliveries and earnings, but taxes serve to level profits.

A sharp increase in overall deliveries and sales is evident as a number of quarterly reports being released in the industry. Earnings are also rising.

► **Accelerated Trend**—The indications are that the difficult and time-consuming building-up period may have been largely completed for much of the industry during 1951. This has now permitted an accelerating trend of sales with a slower degree of climb in the earnings curve.

This becomes evident in an examination of the sales trends now available and summarized in the accompanying table.

► **North American, NAA**, for example, shows an increase of 54.7%, with sales of \$12.7 million, for the first quarter of its 1952 fiscal year, compared to the like 1951 period. But due to that age of equipment and other factors, sales were down from the \$18.1 million shown for the three months ended Sept. 30, 1951.

For the current quarter, despite the

spacings on profit margins and higher taxes, net income was up 15%. The most recent net profit of about \$1.6 million, or \$0.40 per share, compared to \$1.3 million, or \$0.30 a share for the corresponding 1951 period.

► **Douglas**, similar gains in sales and earnings are demonstrated by Douglas. For the three months ended Feb. 28, 1952, the company more than doubled its sales (to \$81.5 million) as compared to the same 1951 period. An almost straight line in sales has been orderly since the first quarter of 1950 when deliveries aggregated but \$26.2 million. The current quarter showed a 59.8% increase in net operating income over the same period in 1951, but after taxes the gain was 10.7%.

► **Republic**—A far more dramatic showing is revealed by Republic's 1952 quarterly report. Sales were \$66,421,000—the highest for any quarter in the company's history. A gain of 241.7% is indicated compared to the first quarter of 1951. With a slightly higher profit

margins, net before taxes gained 250.1%. Higher taxes cut the net profit margin to 2.0%, but net income increased 135%. Republic was able to accelerate its output at a fast clip as it had a model airplane for production when the Korean war broke out. An indication of Republic's past strides is the fact that total sales were about \$6 million in each of the quarters during the first six months of 1947.

► **Boeing**—Gains are being demonstrated by Boeing as a continuing success. With six months of its fiscal year completed, sales show a 128.6% gain over the same period a year ago. Available reports do not disclose the earnings before taxes. In any event, the net income reveals a 203.5% gain to \$161,090, or \$1.31 per share for the current six months, compared to \$266,040, or \$0.40 for the same 1951 period.

Boeing enjoys a profitable commercial business as well as Canadian Government contracts, both exempt from registration. Some of the lighter trading capacities have also been experienced by Boeing. At the present rate, sales for the fiscal year to end Sept. 30, 1952, may double to a volume of \$1.8 billion, established for the 1951 year. Net income may also double the \$746,000, or \$1.23 per share reported for last year.

► **Grumman**—While no interim reports have thus far been reported by Grumman, higher sales and earnings are also publicly indicated. At the recent "mail stockholders' meeting an official reported that sales were about \$278 million for 1951. This would represent a gain of better than 40% over 1950 sales of \$197.7 million. With the same or even slightly lower profit margins, net earnings could exceed the \$5.5 million or \$5.71 per share of 1951 by a comfortable margin.

► **Convair**, the champion of Convair, who has been particularly outspoken against high taxes, predicted at its company's annual meeting that earnings for 1952 will be at least as good as in 1951. As it is reported this close, the quarterly dividend was boosted from 75 to 60 cents.

► **Profit Picture**—An examination of the interim accounts of all reporting aircraft companies shows that a definite spacing in profit margins continues to be the case. Republic, having been a consistent performer in earnings, is the one type plane, demonstrated a slightly higher profit margin for the first quarter of this year.

In all cases examined, higher tax rates served as a major burden of earnings, reducing net profit margins to the 2% level with the highest point at 5%.

—Sally Althoff

Airlines Hard Hit by Fuel Restrictions

- 15

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but has more than they would other
employers.

• No employment contracts be re-
quired with the merged companies.
• No pilot should lose through certain
stresses of merger, he should not suffer
financially in the merger through loss
time, loss of earnings, establishing a
year at a new base at operations, in
Albuquerque, ALPA says.

Boeing and that applies to all pending
contracts, including Boeing-McCawley,
Delta-Norfolk & B. & Capital
Norfolk and National Capital.
The ALPA board claims that full
terms of the recently effective pilot
contracts with Boeing and MCA, for
example, would be mutually important,
of full-scale in merger—they would be
contradictory.

Bonanza Starts Aircraft Service

Boeing Airlines that claims the
first local service aircraft. Bonanza
started a service, Boeing weekly night
route on the 135 mi. from Phoenix to
night stop Las Vegas.

Airlines' fee of \$12.75 weekly in
7 cents a mile compared with trans-
link night route around 4 cents. But
it is 1.25% under the regular Bonanza
fare of 63 cents a mile for the regular
theoretically Phoenix-Las Vegas run.
Bonanza dropped its rate-wide ad-
vanced rates in favor of this per-
centage plan.

Civil Aeronautics Board has approved
the agreement for six months' trial.
Meanwhile, Northwest Airlines has
asked CAB permission to drop the half-
hour flight plan used by other trans-
link.

Northwest believes it has located
little use for the family line, especially
on the DC-121 operation. The family
line plan offers half fare to family mem-
bers accompanying a full fare passenger
during off-peak days in the week.

American has benefited most from
the family fare plan, says CAB people
recently, because AA has worked hardest
at selling it. American first introduced
it as replacing 21-passenger DC-121 with
10-passenger Convair. With the DC-1,
American set rates on its own, with
the Convair, with the Convair, it has built
up an end-work, partly. Family
fare promotion in the "peak" levels.

Ausair Hike Fares

(McGraw-Hill World News)
Melbourne—Australia National Air-
ways and Trans Australia Airways have
increased fares and freight rates this
city by about 15% and other airlines
have introduced rates 10-20% above

those of last year. And the operators
claim that even with the increase Aus-
tralian domestic airline fares are the
lowest in the world. Sharp rise in
weights and supply costs are given in the
reason for raising fares.

Dove Restricted

(McGraw-Hill World News)
Melbourne—The de Havilland Dove
light transport has been restricted to
3,000 hours by the Australian Depart-
ment of Civil Aviation, as a result of
a series of crashes last year. The
same hold false pending action such
factories which are being made on the
plane.

Study of a week published that the
crashes were due to the fact that the
lower boom of the cockpit section after
The plane was operated by Airlines
(Western Australia Ltd.) A certain
type of aluminum alloy is involved—
related construction is being made on
certain other types of planes known to
use this alloy, including U-5 built air-
craft.

SAIDE Granted Egypt Subsidy

(McGraw-Hill World News)
Cairo—A provisional subsidy of
\$125,000 has been approved for
SAIDE (Service Aérien International
d'Egypte) by the Egyptian cabinet,
conditional upon a check of the na-
tion's accounts by the Committee Man-
aging. An additional allocation of
\$25,000, due 1951-1952, has not
yet been decided by the cabinet.
During 1950 SAIDE had \$116,880
in all costs, according to the Civil
Airlines Department.
The cabinet has ruled that a men-
tional committee be formed to de-
termine the conditions which would
permit payment of subsidies to Egyptian
airline firms.

Avincoea Shakeup

(McGraw-Hill World News)
Geneva City—Several employees of
Avincoea's government-owned airline,
Avincoea, were charged with deliberate
of funds "in excess of \$75,000" and
loss of them partly, following a federal
investigation of the airline's finances
last month. In addition, the company's
president and general manager, Col.
Gonzalez Yarnal, has been re-
solved and Enrique Rodriguez has
been named to succeed him.

Defence Needs More Soap

Canada to Drop Tariff on Aircraft

Ottawa, Canada—Finance Minister
Douglas Abbott has proposed that
foreign-made aircraft and engines of types
not built in Canada be allowed free
entry in the future to avoid conflict
with foreign companies to acquire these
aircraft.

Until now, Canada has charged im-
port duties on foreign aircraft to protect
its aircraft industry.

Spanish Gains

(McGraw-Hill World News)
Madrid—Despite stiff competition
from the government-owned Iberia Air-
line, the privately owned and foreign-
owned of Spain's best-known airline, Avi-
acion y Comers, S. A., raised \$21,137 per
passenger in 1951, an increase of 42.06%
over the previous year. Freight loads
went up 285 tons over 1950 for a total
of 515 tons.
Operating on Madrid 170s, the private
carrier increased freight time last
year 20.5% to more than 7,429 hours. Air
mailage was up 15.7% over 1950 to
new high of 1,095,860.

SHORTLINES

• Air France has started New York-
Mexico City service with one flight a
week, will add a fourth flight June 1.
First class fare is \$475; coach rate will
not announced.

• American Airlines has started "in re-
turn" campaign to sell air freight
service to the \$600 a month Los Angeles
spending industry for shipping to out-
of-state markets.

• Capital Airlines is unique being the
Westchester de-division owner light
bells modified to aircraft 200 de-division

Valve Talk

See Wm. R. WHITTAKER CO., Ltd.

In Mexico City,
Senior Member, Aviation Writers Assn.



Recently, the Whittaker people asked me to do a reporting job on
aircraft valves and the men and women who make them.

Why not? What did I know about valves, or else, for that matter?
And why valves? Their's color in an airplane but where's the romance
in a valve?

Whittaker defines a valve as a "continuous or arrangement" used to
open or close a passage to permit or stop the flow of a liquid, gas, vapor
or liquid material in one direction and close against its return.

When I first entered the Wm. R. Whittaker Co., Ltd. plant on
N. Cimarron Ave. in Los Angeles, I had little more than Whittaker's defini-
tion to go by. A valve was simply a gadget to be opened or closed,
with a good many of them required in planes and power plants.

Then I realized that an airplane cannot function without valves—
any more than can the human heart. At Whittaker, I found that valves
aren't gadgets at all, but masterpieces of precision, designed and built
for exerting control in their crucial functions.

I saw how valve failure can shut out a million dollars worth of plane.
I discovered that an efficient valve, in accurate coordination with its
actuator, requires top engineering, top craftsmanship and care take a
year to experiment months in development time. In short, I found, at the
Whittaker Company, a leadership of specialist "know how" turning
out sophisticated designs.

Here, right in the backyard of one such aviation hero, is a com-
pany that grew in nine years from one man idea into a vital
defense concern man-producing critical valves of acknowledged
superiority for the planes of every major American manufacturer.

A story here? You bet there's a story in any young, energetic outfit
that has gone all out in design, production and financing to keep pace
with the industry. In each phase there's a special story. It's been a
struggle against odds... and there's always drama in that.

Whittaker has had problems, many of them. These troubles were
associated with the more than 100,000,000 valves which enter and
leave from the plant or plants they are today. There have been mistakes,
too, but for each mistake there has been a remedy. Problems and mistakes
are not unknown in aviation's headlining technological rush. It's the
manner and speed with which they're handled and solved that counts.

From a single check valve manufactured when the company started,
Whittaker has increased its production to more than 400 types today,
specializing in fuel, hydraulic, hot air and pneumatic valves engineered
and produced as a unit with their actuators and tested exhaustively in
extremes of pressure, heat and cold, sand and dust, longest growth.

The company, with more than \$16,000,000 in backlog, takes
pride in the confidence its products have won throughout the in-
dustry, in the Air Force and the Navy. It's this same confidence
that has brought on one of Whittaker's greatest headaches.

It's difficult to merely order other problems in succeeding years and
give you a cross section of the Wm. R. Whittaker Co., Ltd., together
with a bit of its history, an outline of its achievement and a look at
the men who made those achievements possible.

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Flight Research Engineer position
offers interesting and challenging work
in the design and development of
aircraft systems. The position
requires a degree in Aeronautical
Engineering or equivalent, and
experience in aircraft design and
development. Salary and benefits
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to: Flight Research Engineer,
Wm. R. Whittaker Co., Ltd.,
P.O. Box 100, Los Angeles 40, Calif.

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G-21 GRUMMAN GOOSE

(Model J8F-6-B; serial 3781B)

Although this aircraft was manufactured in 1951, a complete new hull and engine section was installed in October 1954. Specifications are as follows: Airframe T.E. 2534 for tail ref 5.0, wings 180-AH8 (487 in. I.D.), prop No. 36-1029 D17, 500 HP, complete new including AHF, HP and VHF (1 channel), day and night communications including landing lights, radio equipment ECSS-2, engine 240" Foreign inspection license expires May 20 and all facilities complied with for referencing in U.S.A. Foreign traffic, 7 in cabin, pilot and co-pilot. (Bakers provided)

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Also 6000" and 7000" cylinders, plus related 3000" parts.

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600 AMP

Reverse Current Switch AR2005-2

Maximum 375A. New control and engine, complete with accessories, instruments and instruments. Forward for long life service.

Also 6000" and 7000" cylinders, plus related 3000" parts.

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534,000	AN32S-4-8	134,000	AN32S-55-56
245,000	AN32S-4-10	332,000	AN32S-416-16
1,810,000	AN32S-10-8	334,000	AN32S-416-12
465,000	AN32S-10-10	392,000	AN32S-414-14
670,000	AN32S-10-12	370,000	AN32S-416-16

PLUS MANY OTHERS

43 PIECES

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MISCELLANEOUS COMPONENTS

Quantity	Part No.	Qty	Description
100	AN32S-4-6	100	AN32S-4-6
100	AN32S-4-8	100	AN32S-4-8
100	AN32S-4-10	100	AN32S-4-10
100	AN32S-4-12	100	AN32S-4-12
100	AN32S-4-14	100	AN32S-4-14
100	AN32S-4-16	100	AN32S-4-16
100	AN32S-4-18	100	AN32S-4-18
100	AN32S-4-20	100	AN32S-4-20
100	AN32S-4-22	100	AN32S-4-22
100	AN32S-4-24	100	AN32S-4-24
100	AN32S-4-26	100	AN32S-4-26
100	AN32S-4-28	100	AN32S-4-28
100	AN32S-4-30	100	AN32S-4-30
100	AN32S-4-32	100	AN32S-4-32
100	AN32S-4-34	100	AN32S-4-34
100	AN32S-4-36	100	AN32S-4-36
100	AN32S-4-38	100	AN32S-4-38
100	AN32S-4-40	100	AN32S-4-40
100	AN32S-4-42	100	AN32S-4-42
100	AN32S-4-44	100	AN32S-4-44
100	AN32S-4-46	100	AN32S-4-46
100	AN32S-4-48	100	AN32S-4-48
100	AN32S-4-50	100	AN32S-4-50
100	AN32S-4-52	100	AN32S-4-52
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100	AN32S-4-56	100	AN32S-4-56
100	AN32S-4-58	100	AN32S-4-58
100	AN32S-4-60	100	AN32S-4-60
100	AN32S-4-62	100	AN32S-4-62
100	AN32S-4-64	100	AN32S-4-64
100	AN32S-4-66	100	AN32S-4-66
100	AN32S-4-68	100	AN32S-4-68
100	AN32S-4-70	100	AN32S-4-70
100	AN32S-4-72	100	AN32S-4-72
100	AN32S-4-74	100	AN32S-4-74
100	AN32S-4-76	100	AN32S-4-76
100	AN32S-4-78	100	AN32S-4-78
100	AN32S-4-80	100	AN32S-4-80
100	AN32S-4-82	100	AN32S-4-82
100	AN32S-4-84	100	AN32S-4-84
100	AN32S-4-86	100	AN32S-4-86
100	AN32S-4-88	100	AN32S-4-88
100	AN32S-4-90	100	AN32S-4-90
100	AN32S-4-92	100	AN32S-4-92
100	AN32S-4-94	100	AN32S-4-94
100	AN32S-4-96	100	AN32S-4-96
100	AN32S-4-98	100	AN32S-4-98
100	AN32S-4-100	100	AN32S-4-100

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CAA Refuses to Divulge More Data

On Age 14 *Aviation Week* filed a formal request with CAA requesting:

(1) A complete list of grades given to GS 15 & 14 employees—about 140 persons—showing a breakdown for all five parts of the examination, and the overall grade for each, in the test preliminary to the recent reorganization of the Office of Aviation Safety.

(2) Any good explanation, if any stated, as to why at least as 50% of each employee's total grade was based on the oral interview, of which no transcripts were kept.

(3) A copy of the questions which were asked, the text of the written examination.

As we fully expected, CAA strikes out on all three queries.

This is similar to the response to our original question, as to the cost of the reorganization (our own reporting efforts have since ascertained one official estimate that \$30,000 was spent merely on personal travel alone, in connection with the reorganization).

We have received no answer to the seven vital questions asked on this page May 24, one pertaining to the oral. These questions also asked why no transcripts were kept of oral group or individual interviews? Why were witness' rights ignored? Why were some individuals offered special favor—back in closer or new geographical locations if they promised not to protest their assignments locally? One answer did develop—that a new Grade 14 post was, indeed, set up in each region, paying each of the seven hand-picked candidates then \$5,000 a year.

Admiral Hensley, CAA Administrator, "insisted" that we did not need enough facts from him and other authorized CAA officials. "We are about ready to cooperate in providing information," he wrote. "CAA is not answering our last questions. We had hundreds of CAA employees on our list, and CAA doesn't dare reveal the whole story of the so-called reorganization it calls a 'reorganization'."

In the latest letter from CAA to *Aviation Week*, dated May 18, Ben Stires (chief of information), in attempting to answer Question (2) of our letter, merely repeats (without answering the question) much of the same information given by CAA's directors Hensley and Davis in their letter to us. Much of the following is merely a repetition of information previously furnished to you by Messrs. Hensley and Davis and published in the May 31 *Aviation Week*. We write. We quote you the repetition.

In dropping our Request (3), Mr. Stires contends that this test (which was widely criticized in the CAA for its susceptibility to the employees or jobs under test) was "obtained from the Civil Service Commission and is not the property of CAA and the CAA is not authorized to make a public release."

Mr. Stires takes note of the test and copy about the employees that Hensley and Davis have put on "administrative" shelves.

"Since all of the new positions to be filled were previously considered with the direction and management of aviation safety program, it was considered vital that only those individuals who displayed the highest degree of competence and the work of others be selected. It should be understood that all of the candidates considered were highly qualified individuals."

It was executive ability in addition to technical qualifications that the selection procedure was designed to identify," *Aviation Week* (Hensley and Davis) have shown this to be untrue in recent columns.

As to our request (1), note this:

"In response to your request for a 'complete list of grades' given to those who participated in the examination, it is a standard procedure both in government and in those private industries which utilize competitive examinations to furnish information about scores only to the individual himself. The CAA already has furnished each of the individual candidates a greater amount of information than is customary in connection with Civil Service examinations. General Administration of most scores on papers other than to provide a possible source of embarrassment to individuals whose scores were low."

And numerous CAA employees who have written to ask their bosses for more information as to why their grades were so low (some of their inquiries were not even acknowledged) will enjoy this:

"Individuals who may have thought that they had not been adequately had ample opportunity to protest their scores. All CAA employees have full appeal rights, not only through several administrative channels, but to a CAA standing board of appeals and, if necessary, they may obtain special review by the Department of Commerce. The Standard Practices Manual, available in every CAA office, clearly explains every step in the appeal procedure."

This may sound very gracious and fair to a taxpayer who fumes about bureaucracy. But as for the federal employee himself, he knows better—unless he doesn't care about his future standing with his superiors anywhere.

"We regret," claims Mr. Stires, "that we are unable to give you all the material called for in your request except, but I think you will understand that this is impossible in light of long-standing and thoroughly published procedures governing such examinations. Please feel free to call on us at any time we can be of service."

The fellow Stires is a trait.

CAA's longest offer to tell the facts about this reorganization at a mockery. Let the second so show.

This closes the editorial scene on the reorganization act itself. We are preparing a new issue on this most important unit of CAA—this lack of ability can mean disaster to aviation. It starts elsewhere in today's issue. We quote our many new and conscientious correspondents in long waiting from their points in CAA. Concepts of such confusion do not come quickly or easily, as we all learn from day-to-day developments that are conceived by and about the Federal Administration.

The task is big. But the press should not merely sit idly by and deplore. The public wants facts. *Aviation Week* will continue to probe inner workings of CAA that have never been pathed before. We intend to keep showing you exactly what CAA does and does not do to members aviation safety.

The press can also set the stage for hysteresis. The closer itself is up to government or the people through their elected representatives.

—Robert H. Wood

40 YEARS OF AUTOMATIC FLIGHT...BY SPERRY



1912 The first Sperry automatic pilot was flight tested on a Curtiss hydro-aeroplane in 1912 at Hempstead Harbor, New York. This was the world's first gyroscopic remote pilot to fly an airplane.



1914 Lawrence Sperry, in a public demonstration of automatic flight in Paris, 1914, flew the latest model Sperry Gyroplane with his "toddle" rumpole.



1916 Alexander de Seville, the first pilot to fly the world's first automatic pilot, the Sperry Gyroplane, developed during 1916 by Sperry working with the U.S. Navy. These automatically controlled "flying boats" were based near Great South Bay, Long Island.



1933 Automatic flight again was public evidence in 1933 when Wiley Post made the first solo flight around the world with the Sperry automatic pilot as his "toddle" on the world tour.



1937 First completely automatic landings were made by the U.S. Army Air Corps in 1937 by coupling radio with the Sperry automatic pilot.



1943 The first electronic automatic pilot flew thousands of miles in World War II and advanced the art of precision bombing by providing an improved stable platform.



1947 The first "production" aircraft, U.S. Air Force's A-10 Thunderbolt II, equipped with Sperry automatic pilot and automatic approach system, crossed the Atlantic both ways in 1947 without human hands touching the controls—arriving take-offs and landings.



1952 The modern Gyroplane flight control is the nucleus of Sperry's 40 years of research, development and manufacture of automatic controls for aircraft. This variable, all-weather pilot represents a high performance technique for automatic control which is readily adaptable to all types of aircraft—fighters, executive craft, jets, helicopters, lighter-than-air ships and guided missiles. This technique pioneered by Sperry has led to a new fundamental concept of flight for the control of tomorrow. Sperry Gyroplane Company Division of The Sperry Corporation, Great Neck, New York.



REPLACING A HUB ON A GEAR . . . Rollpin, self-retained in shaft, is simply snapped into molded slot to position sintered gear. This application, by Ditto Inc., effects major savings in assembly. Rollpin's high shear strength is particularly valuable here.



REPLACING A MACHINED PIN . . . In the lubrication pump assembly of the Cummins HR-400 diesel engine, two Rollpins are used as positioning dowels. Rollpins are self-retaining in production-drilled holes . . . quick to assemble and easy to remove.



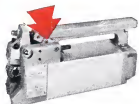
REPLACING A HEADED PIN . . . In this hinge pin application, Rollpin is simply and inexpensively driven in place, greatly reducing assembly costs. Constant spring tension holds Rollpin firmly in place . . . eliminates loosening of hinge due to wear.



REPLACING A SET SCREW . . . Paper feed rollers are quickly, economically pinned to shaft by Rollpins in this office machine made by Ditto Inc. Flush fit affords neat appearance . . . spring tension assures positive, permanent positioning of rollers.



REPLACING A RIVET . . . Rollpin serves as guide shaft for spring-loaded electrical interlock contacts. The Square D Company reports that rivet failure previously occurred at the clinched end under normal operating impact and vibration.



REPLACING A BOLT AND NUT . . . Rollpins act as fasteners and pivots for the linkages in this Miller Electric Welder. Rollpins may be used with a free fit in outer or inside members depending upon product design requirements.

6 more examples of assembly-time saving with **ROLLPIN** TRADE MARK

Rollpins are slotted, tubular steel, pressed-fit pins with chamfered ends. They drive easily into holes drilled to normal tolerances, compressing as driven. Reaming, tapering, extra assembly steps are eliminated. Rollpins are *locked* in place by the constant pressure they exert against hole walls. Inserted with an automatic press or by hand, Rollpins are readily removable with a drift or pin punch—and reusable again and again.

Elastic Stop Nuts with the famous red collar are another ESNA® product



FOR DESIGN INFORMATION—fill out and mail our coupon. If your plans include applications similar to those on this page—or clevis pins, keys, taper pins or stop pins—you can't afford to be without details on how much faster and cheaper Rollpin can do the job.

Dept. R6-525, Elastic Stop Nut Corporation of America
2330 Vauxhall Road, Union, New Jersey

Please send me the following free information on ESNA self-latching fasteners:

- ☐ Rollpin bulletin and sample Rollpins ☐ AN-ESNA conversion chart
☐ Elastic Stop Nut Bulletin ☐ Here is a drawing of our product.

What fastener do you recommend?

Name _____ Title _____

Firm _____

Street _____

City _____ Zone _____ State _____